Contents

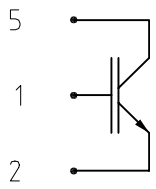
High Voltage BIMOSFET™

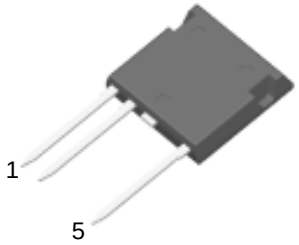
in High Voltage ISOPLUS i4-PAC™

IXBF 9N140
IXBF 9N160

I_{C25} = 7 A
V_{CES} = 1400/1600 V
$V_{CE(sat)}$ = 4.9V
t_f = 40 ns

Monolithic Bipolar MOS Transistor





IGBT

Symbol	Conditions		Maximum Ratings	
V_{CES}	T_{VJ} = 25°C to 150°C	IXBF 9N140	1400	V
		IXBF 9N160	1600	V
V_{GES}			± 20	V
I_{C25}	T_C = 25°C		7	A
I_{C90}	T_C = 90°C		4	A
I_{CM}	V_{GE} = 15/0 V; R_G = 100 Ω; T_{VJ} = 125°C		12	A
V_{CEK}	RBSOA, Clamped inductive load; L = 100 µH		$0.8V_{CES}$	
P_{tot}	T_C = 25°C		70	W

Symbol	Conditions (T_{VJ} = 25°C, unless otherwise specified)	Characteristic Values min.	typ.	max.	
$V_{CE(sat)}$	I_C = 5 A; V_{GE} = 15 V; T_{VJ} = 25°C		4.9	7	V
	T_{VJ} = 125°C		5.6		V
$V_{GE(th)}$	I_C = 0.5 mA; V_{GE} = V_{CE}	4		8	V
I_{CES}	V_{CE} = 0.8V_{CES}; V_{GE} = 0 V; T_{VJ} = 25°C			0.1	mA
	T_{VJ} = 125°C		0.1		mA
I_{GES}	V_{CE} = 0 V; V_{GE} = ± 20 V			500	nA
$t_{d(on)}$	Inductive load, T_{VJ} = 125°C		200		ns
t_r	V_{CE} = 960 V; I_C = 5 A		60		ns
$t_{d(off)}$	V_{GE} = 15/0 V; R_G = 100 Ω		180		ns
t_f			40		ns
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz		550		pF
Q_{Gon}	V_{CE} = 600V; V_{GE} = 15 V; I_C = 7 A		44		nC
V_F	(reverse conduction); I_F = 5 A		3.6		V
R_{thJC}				1.75	K/W

Features

- High Voltage BIMOSFET™
  - substitute for high voltage MOSFETs with significantly lower voltage drop
  - fast switching for high frequency operation
  - reverse conduction capability
- ISOPLUS i4-PAC™ high voltage package
  - isolated back surface
  - enlarged creepage towards heatsink
  - enlarged creepage between high voltage pins
  - application friendly pinout
  - high reliability
  - industry standard outline

Applications

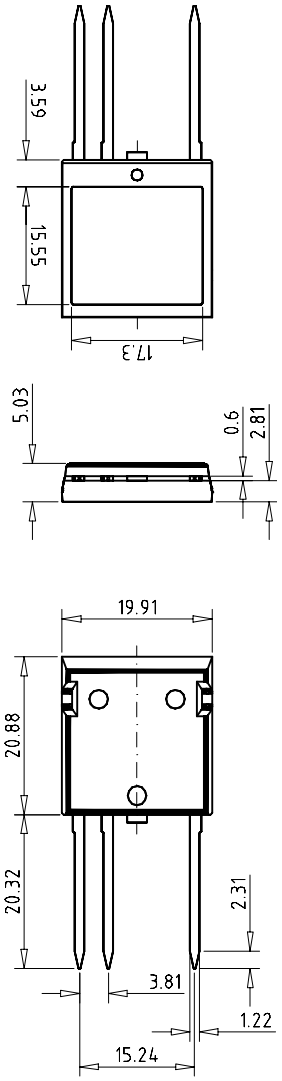
- switched mode power supplies
- DC-DC converters
- resonant converters
- lamp ballasts
- laser generators, x ray generators

Component

Symbol	Conditions	Maximum Ratings	
T_{VJ}		-55...+150	°C
T_{stg}		-55...+125	°C
V_{ISOL}	$I_{ISOL} \leq 1$ mA; 50/60 Hz	2500	V~
F_C	mounting force with clip	20...120	N

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
d_S,d_A	C pin - E pin	7		mm
d_S,d_A	pin - backside metal	5.5		mm
R_{thCH}	with heatsink compound		0.15	K/W
Weight			9	g

Dimensions in mm (1 mm = 0.0394")



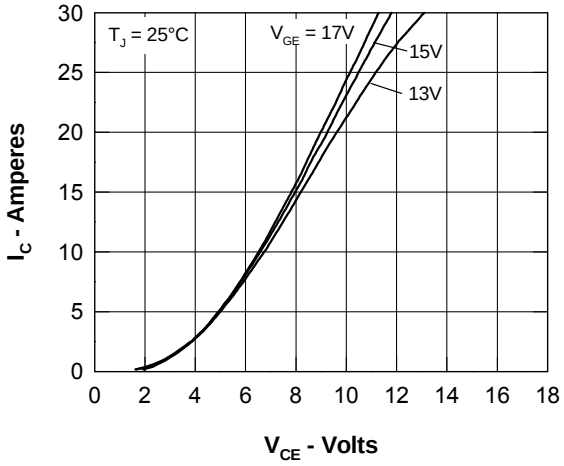


Fig. 1 Typ. Output Characteristics

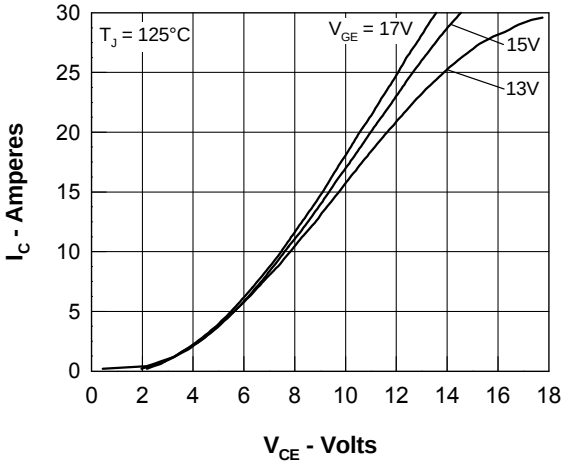


Fig. 2 Typ. Output Characteristics

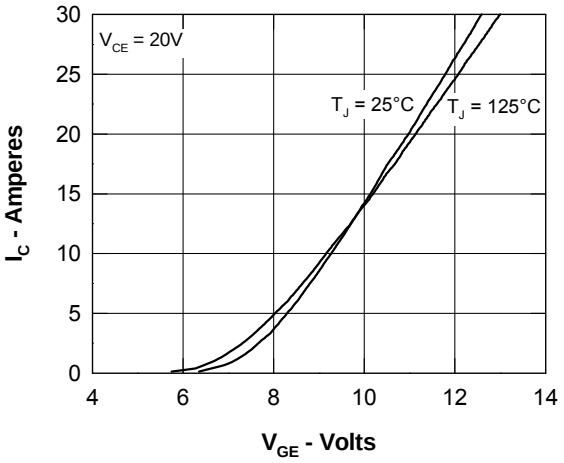


Fig. 3 Typ. Transfer Characteristics

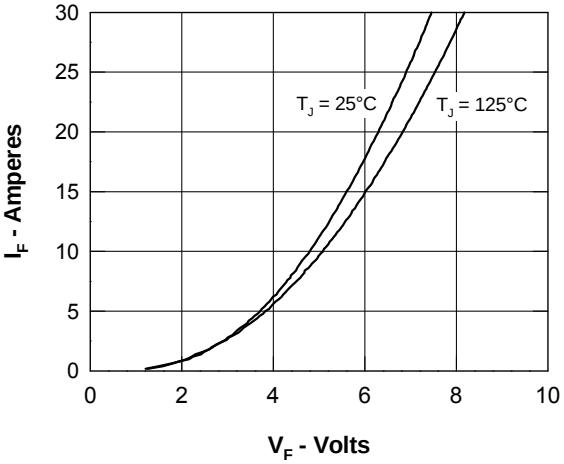


Fig. 4 Typ. Characteristics of Reverse Conduction

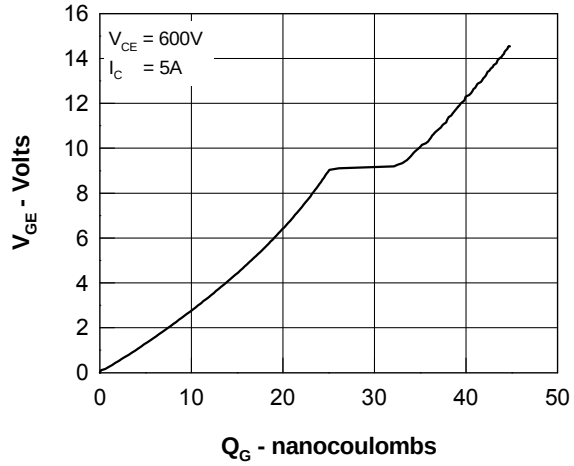


Fig. 5 Typ. Gate Charge characteristics

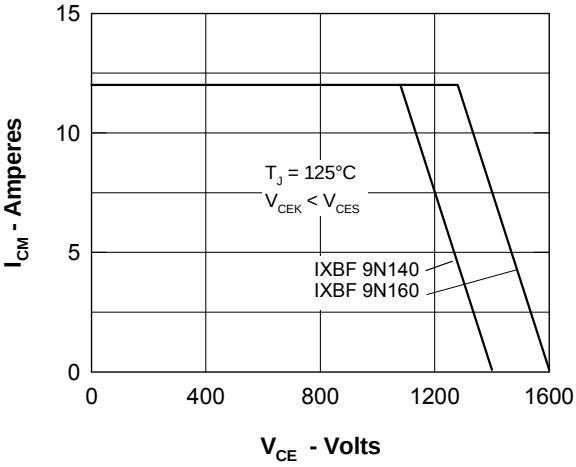


Fig. 6 Reverse Biased Safe Operating Area RBSOA

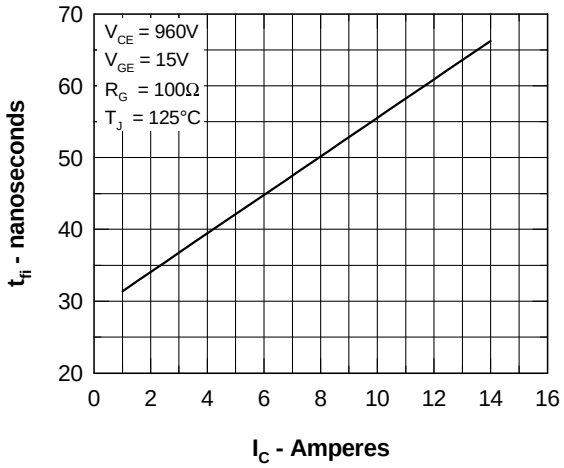


Fig. 7 Typ. Fall Time

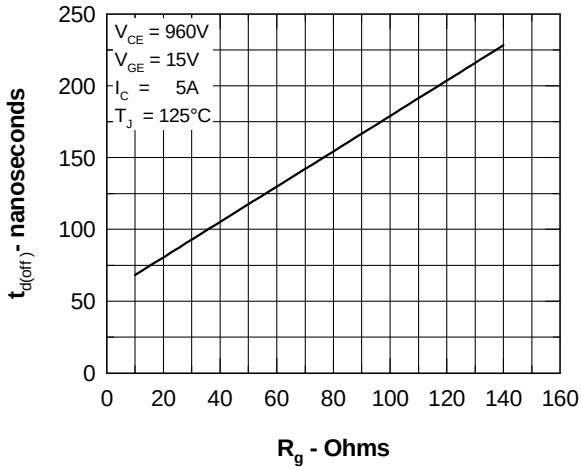


Fig. 8 Typ. Turn Off Delay Time

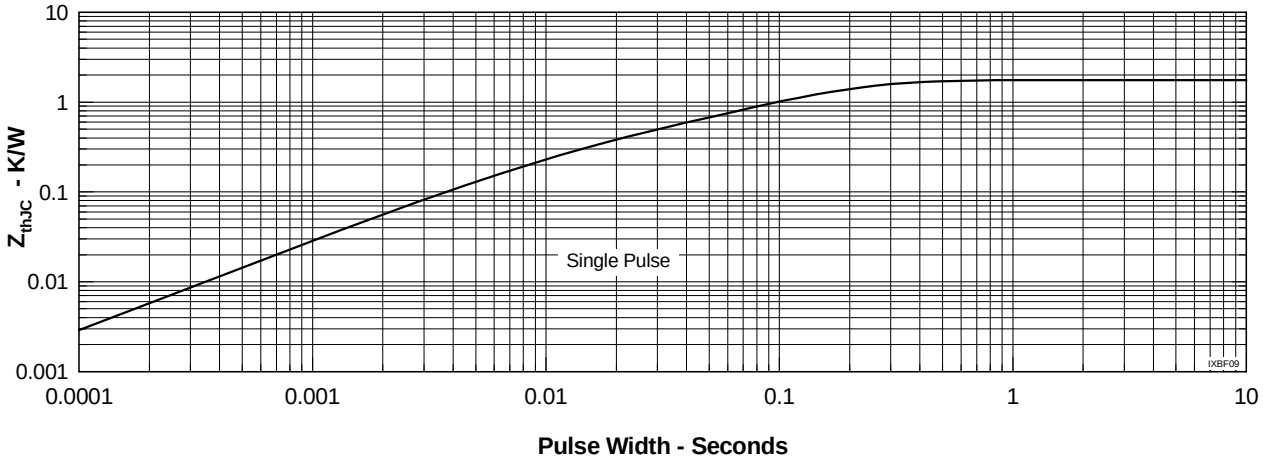


Fig. 9 Typ. Transient Thermal Impedance

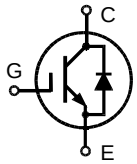
IXYS

High Voltage BIMOSFET™ Monolithic Bipolar MOS Transistor

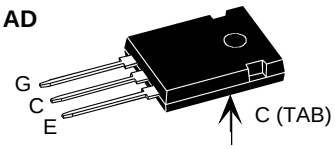
N-Channel, Enhancement Mode

IXBH 9N140
IXBH 9N160

V_{CES} = 1400/1600 V
I_{C25} = 9 A
$V_{CE(sat)}$ = 4.9 V typ.
t_{fi} = 40 ns



TO-247 AD



G = Gate, C = Collector,
E = Emitter, TAB = Collector

Symbol	Conditions	Maximum Ratings 9N140	9N160	
V_{CES}	T_J = 25°C to 150°C	1400	1600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	1400	1600	V
V_{GES}	Continuous		±20	V
V_{GEM}	Transient		±30	V
I_{C25}	T_C = 25°C,		9	A
I_{C90}	T_C = 90°C		5	A
I_{CM}	T_C = 25°C, 1 ms		10	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 100 Ω V_{CE} = 0.8•V_{CES} Clamped inductive load, L = 100 µH		I_{CM} = 12	A
P_C	T_C = 25°C		100	W
T_J			-55 ... +150	°C
T_{JM}			150	°C
T_{stg}			-55 ... +150	°C
T_L	1.6 mm (0.063 in) from case for 10 s		300	°C
M_d	Mounting torque		1.15/10	Nm/lb.in.
Weight			6	g

Symbol	Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 1 mA, V_{GE} = 0 V	9N140	1400			V
		9N160	1600			V
$V_{GE(th)}$	I_C = 0.5 mA, V_{CE} = V_{GE}		4		8	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			100	µA
	V_{GE} = 0 V	T_J = 125°C		0.1		mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				± 500	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V			4.9	7	V
		T_J = 125°C		5.6		V

Features

- International standard package JEDEC TO-247 AD
- High Voltage BIMOSFET™
  - replaces high voltage Darlingtons and series connected MOSFETs
  - lower effective $R_{DS(on)}$
- Monolithic construction
  - high blocking voltage capability
  - very fast turn-off characteristics
- MOS Gate turn-on
  - drive simplicity
- Reverse conducting capability

Applications

- Flyback converters
- DC choppers
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- CRT deflection
- Lamp ballasts

Advantages

- Easy to mount with 1 screw (isolated mounting screw hole)
- Space savings
- High power density

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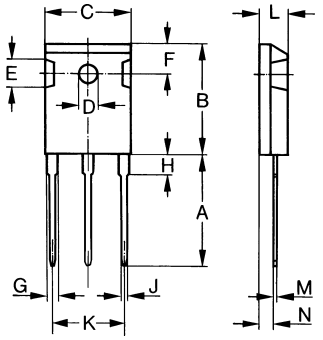
Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		550		pF
C_{oes}			36		pF
C_{res}			5		pF
Q_g	I_C = 5 A, V_{CE} = 600 V, V_{GE} = 15 V		44		nC
$t_{d(on)}$	**Inductive load, T_J = 125°C**		200		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH,		60		ns
$t_{d(off)}$	V_{CE} = 960 V, R_G = 100 Ω		180		ns
t_{fi}			40		ns
R_{thJC}				1.25	K/W
R_{thCK}			0.25		K/W

Reverse Conduction

Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.
V_F	$I_F = I_{C90}$, V_{GE} = 0 V		3.6	5

TO-247 AD Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

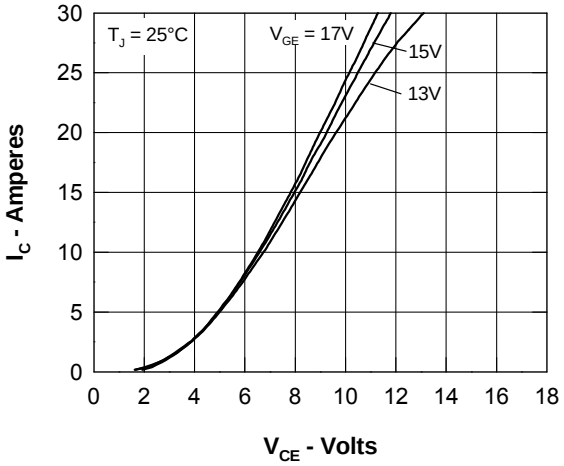


Fig. 1 Typ. Output Characteristics

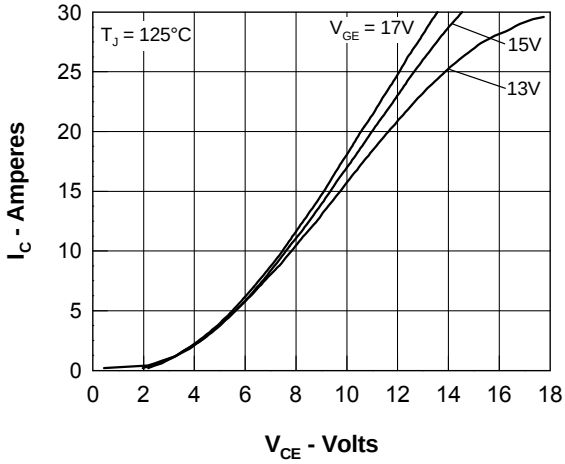


Fig. 2 Typ. Output Characteristics

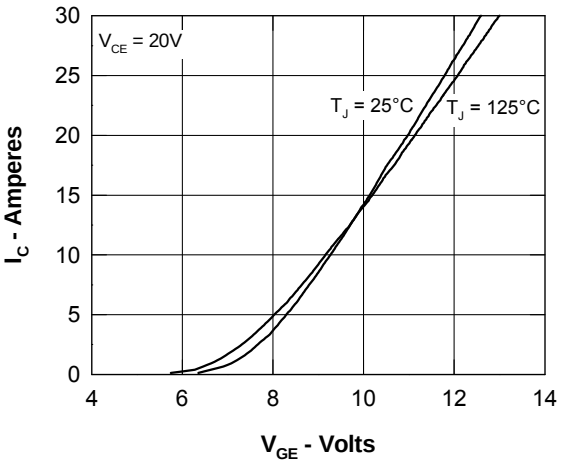


Fig. 3 Typ. Transfer Characteristics

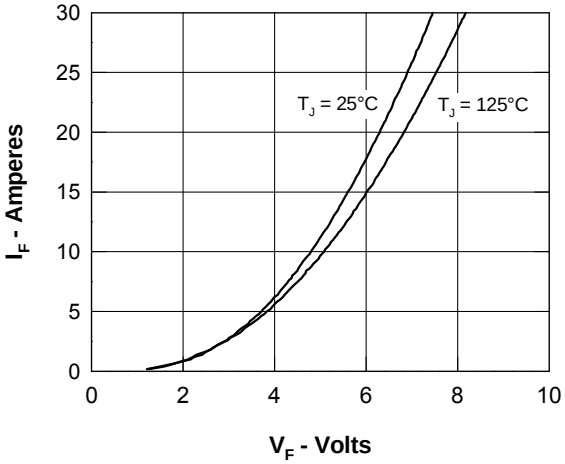


Fig. 4 Typ. Characteristics of Reverse Conduction

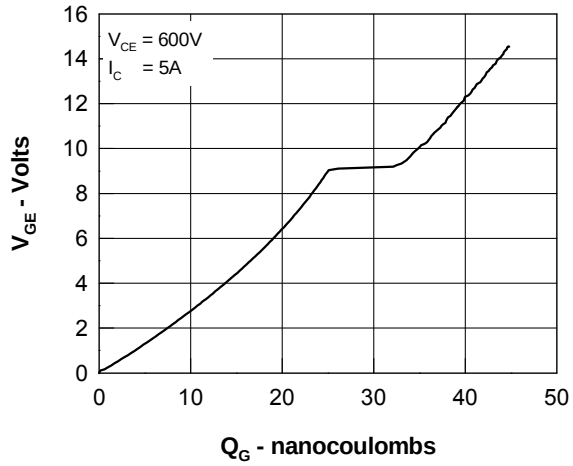
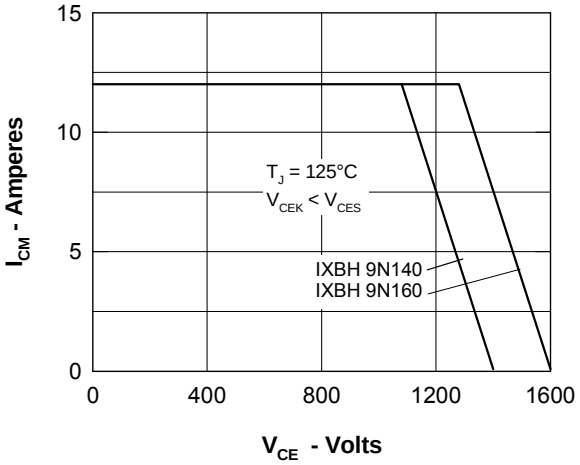


Fig. 5 Typ. Gate Charge characteristics



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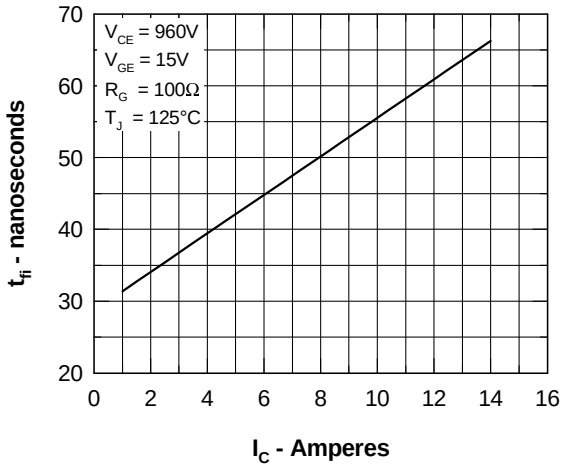


Fig. 7 Typ. Fall Time

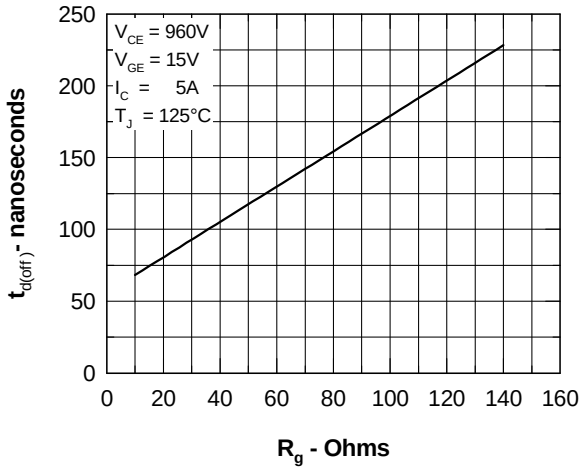
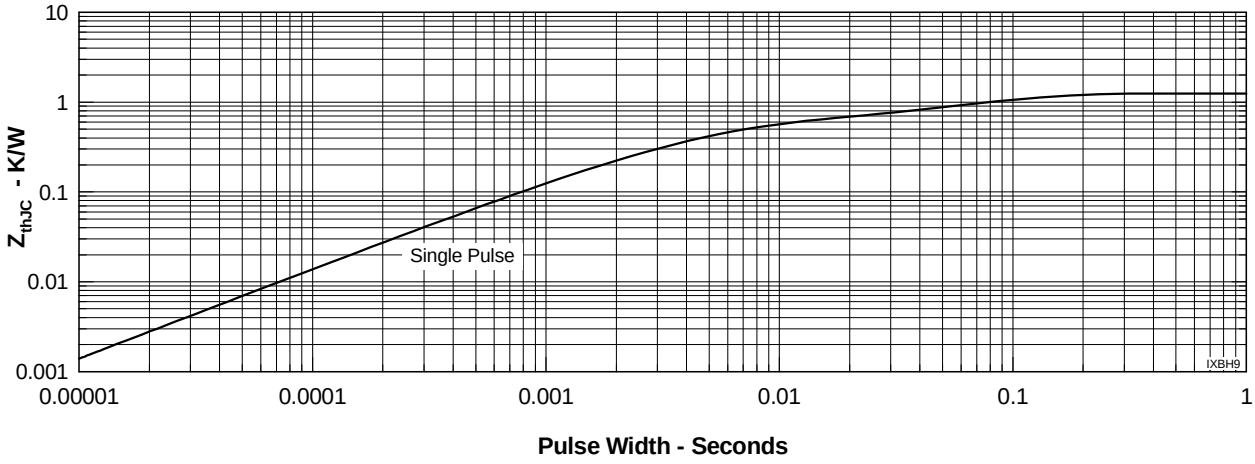


Fig. 8 Typ. Turn Off Delay Time



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IXBH 15N140
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V_{CES} = 1400/1600 V
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$V_{CE(sat)}$ = 5.8 V typ.
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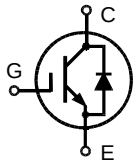

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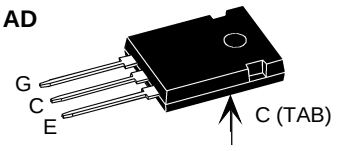

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V_{CES}	T_J = 25°C to 150°C	1400	1600	V
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V_{GES}	Continuous		±20	V
V_{GEM}	Transient		±30	V
I_{C25}	T_C = 25°C,		15	A
I_{C90}	T_C = 90°C		9	A
I_{CM}	T_C = 25°C, 1 ms		18	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 47 Ω V_{CE} = 0.8•V_{CES} Clamped inductive load, L = 100 µH		I_{CM} = 18	A
P_C	T_C = 25°C		150	W
T_J			-55 ... +150	°C
T_{JM}			150	°C
T_{stg}			-55 ... +150	°C
T_L	1.6 mm (0.063 in) from case for 10 s		300	°C
M_d	Mounting torque		1.15/10	Nm/lb.in.
Weight			6	g

Symbol	Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 1 mA, V_{GE} = 0 V	15N140	1400			V
		15N160	1600			V
$V_{GE(th)}$	I_C = 1 mA, V_{CE} = V_{GE}		4		8	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			100	µA
	V_{GE} = 0 V	T_J = 125°C		0.1		mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				± 500	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V			5.8	7.0	V
		T_J = 125°C		7.7		V

Features

- International standard package JEDEC TO-247 AD
- High Voltage BIMOSFET™
  - replaces high voltage Darlingtons and series connected MOSFETs
  - lower effective $R_{DS(on)}$
- Monolithic construction
  - high blocking voltage capability
  - very fast turn-off characteristics
- MOS Gate turn-on
  - drive simplicity
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- Flyback converters
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Advantages

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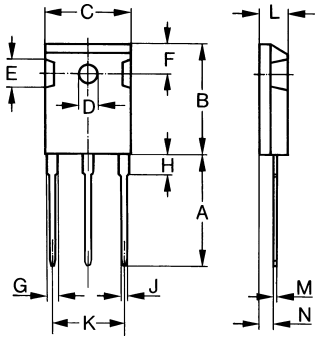
Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		1200		pF
C_{oes}			80		pF
C_{res}			11		pF
Q_g	I_C = 9 A, V_{CE} = 600 V, V_{GE} = 15 V		45		nC
$t_{d(on)}$	**Inductive load, T_J = 125°C**		200		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH,		60		ns
$t_{d(off)}$	V_{CE} = 960 V, R_G = 47 Ω		180		ns
t_{fi}			40		ns
R_{thJC}				0.83	K/W
R_{thCK}			0.25		K/W

Reverse Conduction

Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	$I_F = I_{C90}$, V_{GE} = 0 V		3.8	5	V

TO-247 AD Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

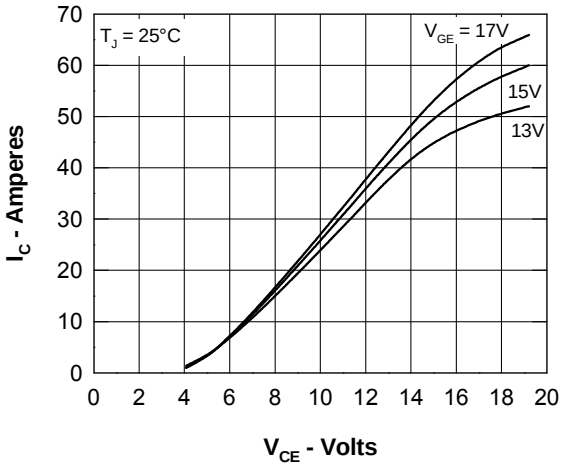


Fig. 1 Typ. Output Characteristics

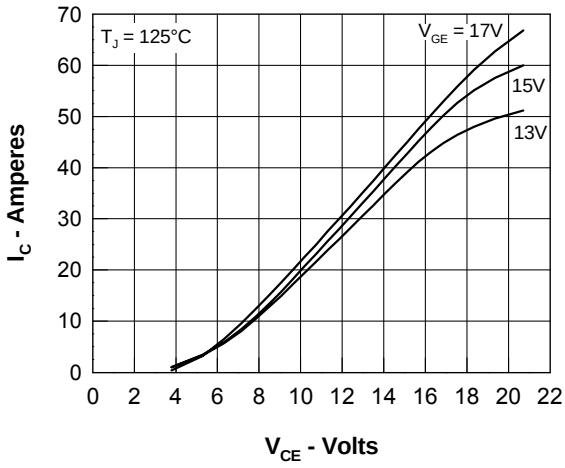


Fig. 2 Typ. Output Characteristics

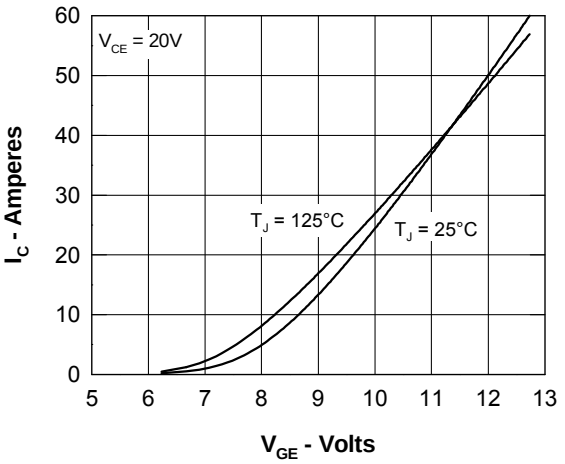


Fig. 3 Typ. Transfer Characteristics

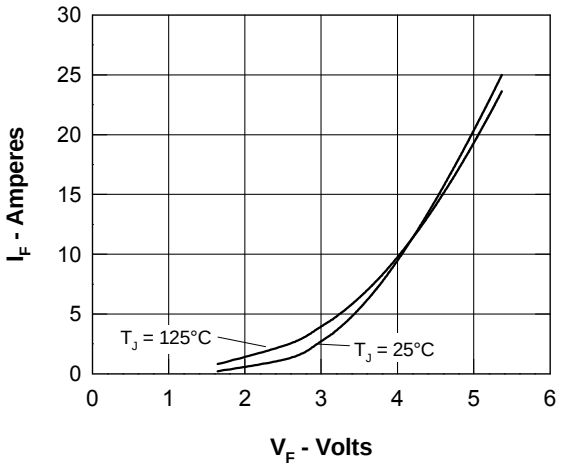


Fig. 4 Typ. Characteristics of Reverse Conduction

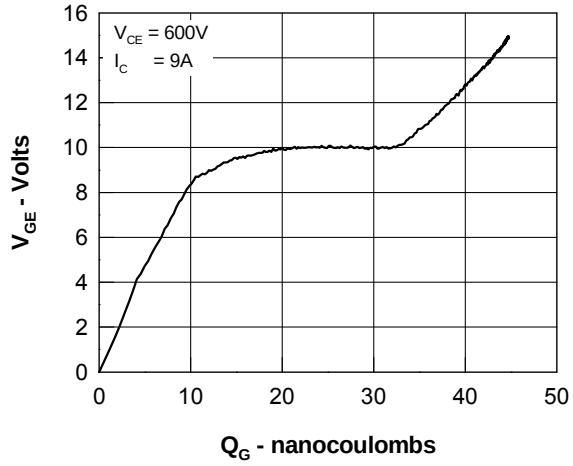


Fig. 5 Typ. Gate Charge characteristics

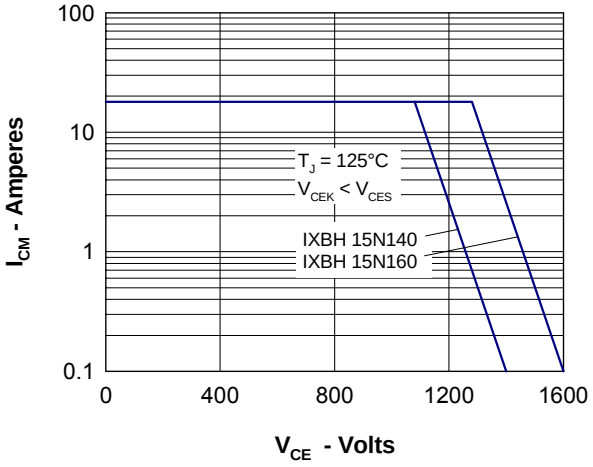


Fig. 6 Reverse Biased Safe Operating Area RBSOA

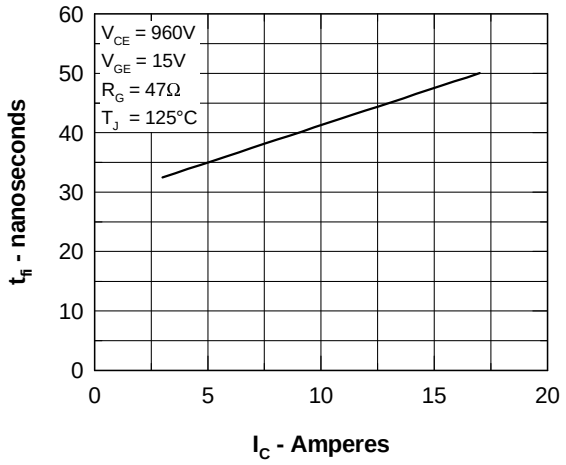


Fig. 7 Typ. Fall Time

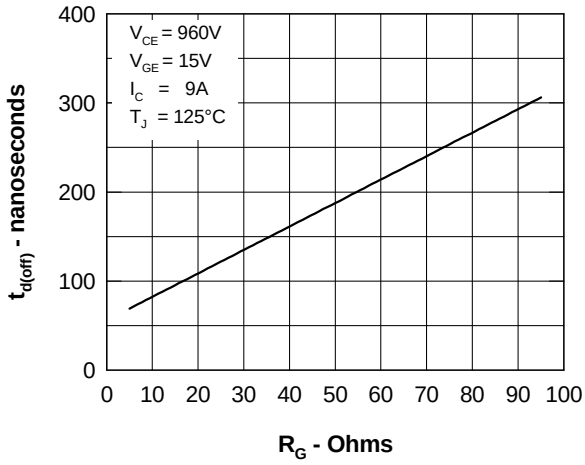


Fig. 8 Typ. Turn Off Delay Time

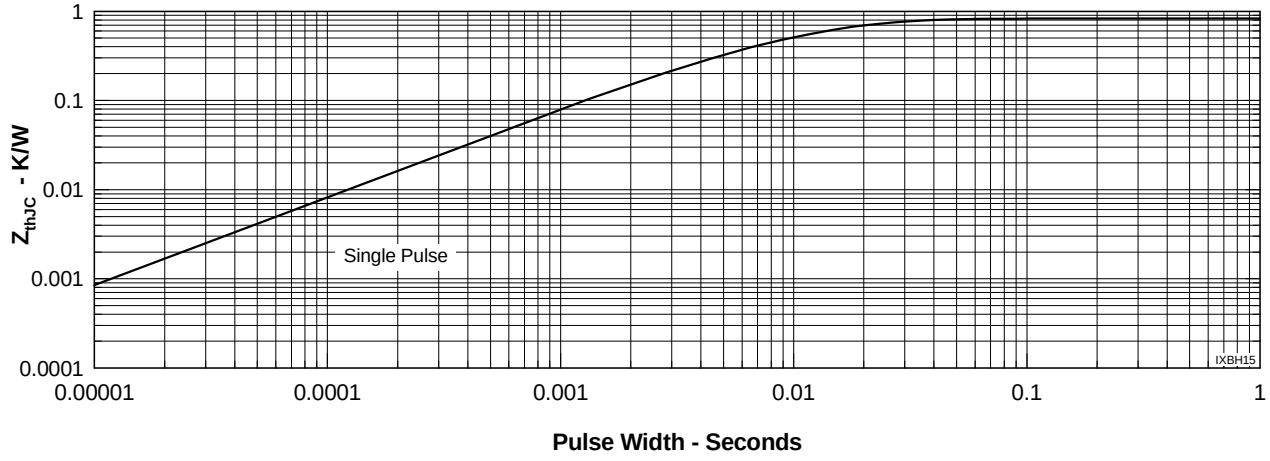


Fig. 9 Typ. Transient Thermal Impedance

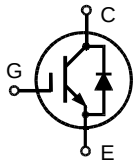
IXYS

High Voltage BIMOSFET™ Monolithic Bipolar MOS Transistor

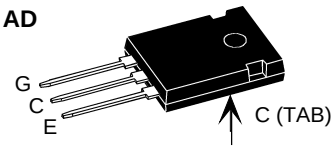
N-Channel, Enhancement Mode

IXBH 20N140
IXBH 20N160

V_{CES} = 1400/1600 V
I_{C25} = 20 A
$V_{CE(sat)}$ = 4.7 V typ.
t_{fi} = 40 ns



TO-247 AD



G = Gate, C = Collector,
E = Emitter, TAB = Collector

Symbol	Conditions	Maximum Ratings 20N140	20N160	
V_{CES}	T_J = 25°C to 150°C	1400	1600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	1400	1600	V
V_{GES}	Continuous		±20	V
V_{GEM}	Transient		±30	V
I_{C25}	T_C = 25°C,		20	A
I_{C90}	T_C = 90°C		13	A
I_{CM}	T_C = 25°C, 1 ms		26	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 27 Ω V_{CE} = 0.8•V_{CES} Clamped inductive load, L = 100 µH		I_{CM} = 24	A
P_C	T_C = 25°C		200	W
T_J			-55 ... +150	°C
T_{JM}			150	°C
T_{stg}			-55 ... +150	°C
T_L	1.6 mm (0.063 in) from case for 10 s		300	°C
M_d	Mounting torque		1.15/10	Nm/lb.in.
Weight			6	g

Symbol	Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 1 mA, V_{GE} = 0 V	20N140	1400			V
		20N160	1600			V
$V_{GE(th)}$	I_C = 1.5 mA, V_{CE} = V_{GE}		4		8	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			300	µA
	V_{GE} = 0 V	T_J = 125°C			1	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				± 500	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V			4.7	6.5	V
		T_J = 125°C		5.4		V

Features

- International standard package JEDEC TO-247 AD
- High Voltage BIMOSFET™
  - replaces high voltage Darlingtons and series connected MOSFETs
  - lower effective $R_{DS(on)}$
- Monolithic construction
  - high blocking voltage capability
  - very fast turn-off characteristics
- MOS Gate turn-on
  - drive simplicity
- Reverse conducting capability

Applications

- Flyback converters
- DC choppers
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- CRT deflection
- Lamp ballasts

Advantages

- Easy to mount with 1 screw (isolated mounting screw hole)
- Space savings
- High power density

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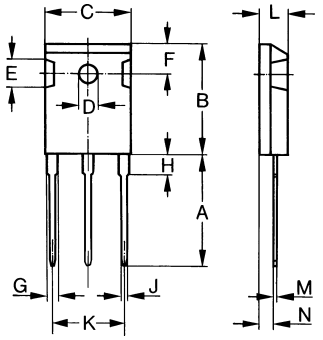
Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		2100		pF
C_{oes}			140		pF
C_{res}			20		pF
Q_g	I_C = 13 A, V_{CE} = 600 V, V_{GE} = 15 V		60		nC
$t_{d(on)}$	**Inductive load, T_J = 125°C**		200		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH,		60		ns
$t_{d(off)}$	V_{CE} = 960 V, R_G = 27 Ω		180		ns
t_{fi}			40		ns
R_{thJC}				0.6	K/W
R_{thCK}			0.25		K/W

Reverse Conduction

Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	$I_F = I_{C90}$, V_{GE} = 0 V		3.6	5	V

TO-247 AD Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

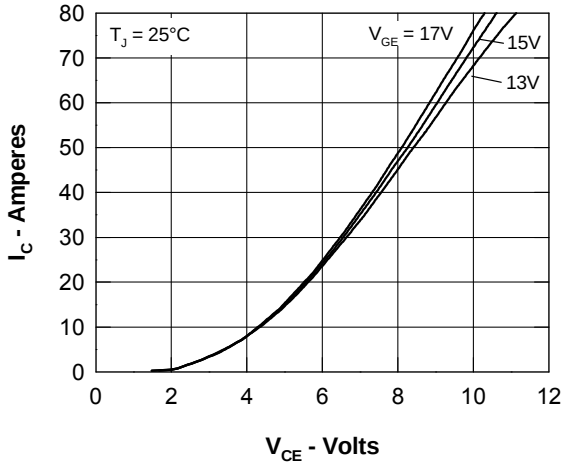


Fig. 1 Typ. Output Characteristics

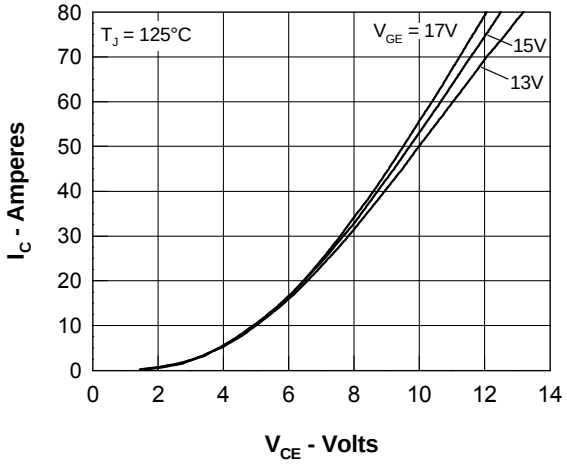


Fig. 2 Typ. Output Characteristics

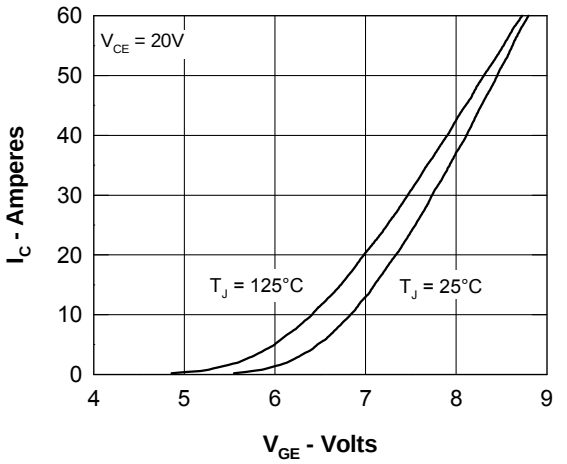


Fig. 3 Typ. Transfer Characteristics

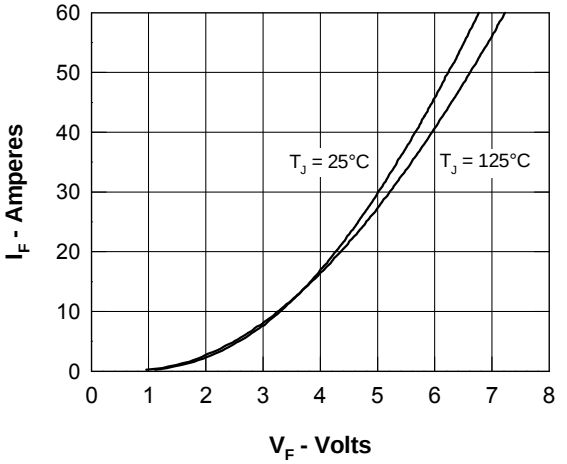


Fig. 4 Typ. Characteristics of Reverse Conduction

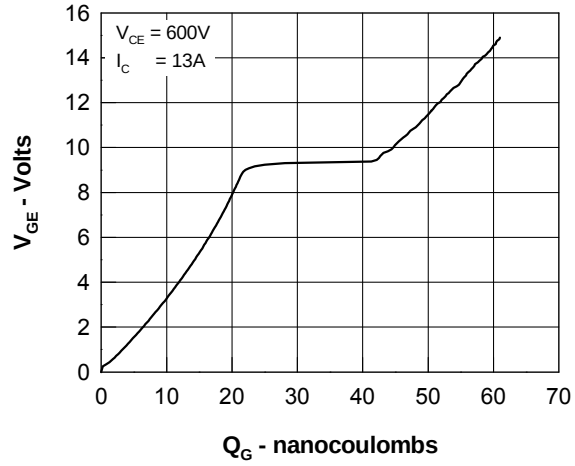


Fig. 5 Typ. Gate Charge characteristics

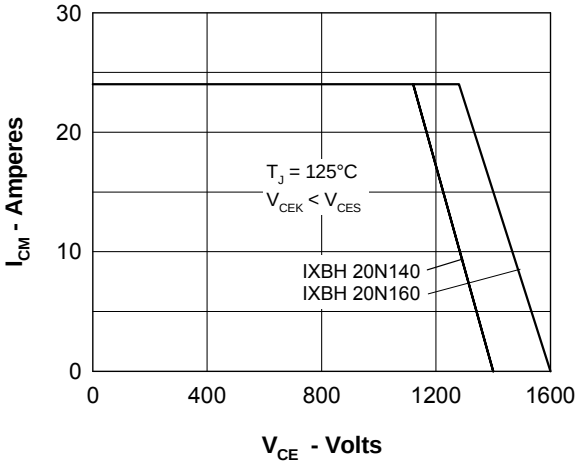


Fig. 6 Reverse Biased Safe Operating Area RBSOA

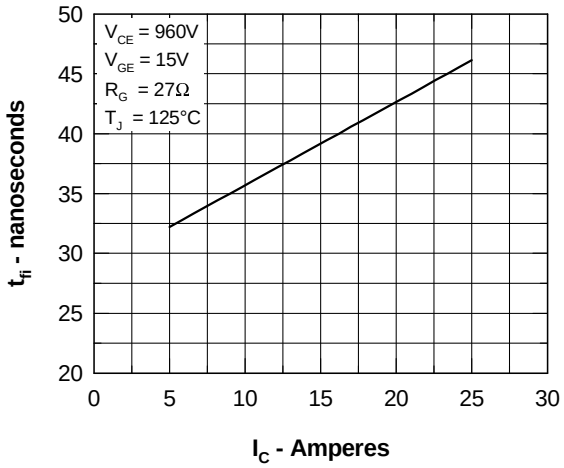


Fig. 7 Typ. Fall Time

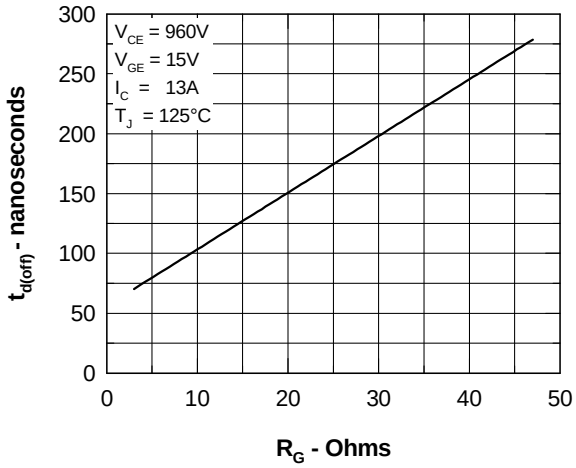


Fig. 8 Typ. Turn Off Delay Time

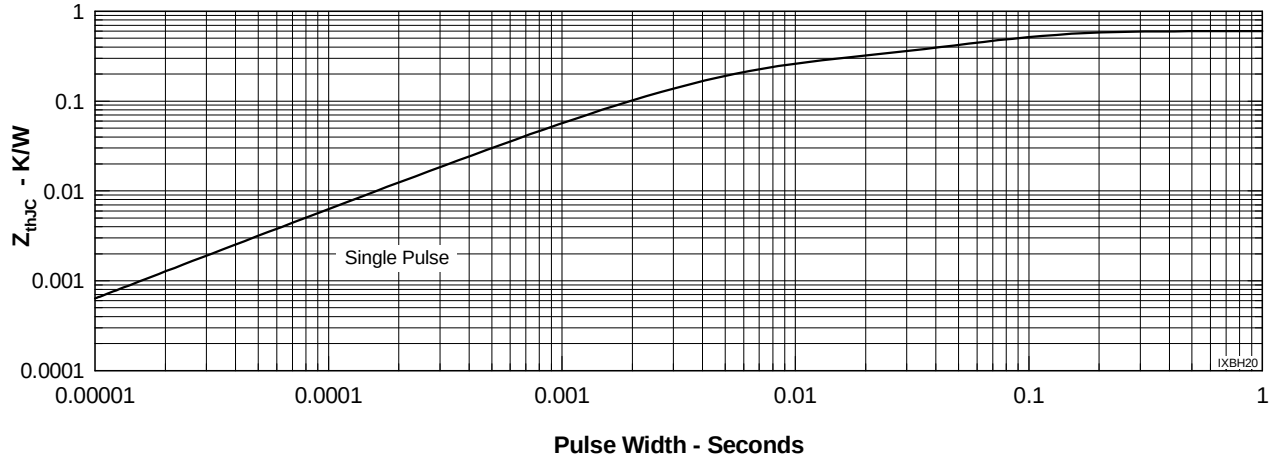


Fig. 9 Typ. Transient Thermal Impedance

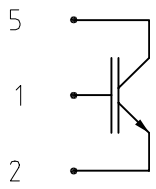
High Voltage BIMOSFET™

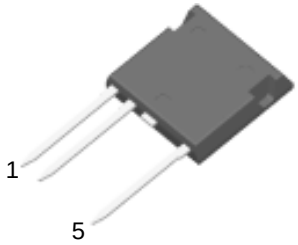
in High Voltage ISOPLUS i4-PAC™

IXBF 40N140
IXBF 40N160

I_{C25} = 28 A
V_{CES} = 1400/1600 V
$V_{CE(sat)}$ = 6.2 V
t_f = 40 ns

Monolithic Bipolar MOS Transistor





IGBT

Symbol	Conditions		Maximum Ratings	
V_{CES}	T_{VJ} = 25°C to 150°C	IXBF 40N140	1400	V
		IXBF 40N160	1600	V
V_{GES}			± 20	V
I_{C25}	T_C = 25°C		28	A
I_{C90}	T_C = 90°C		16	A
I_{CM}	V_{GE} = 15/0 V; R_G = 22 Ω; T_{VJ} = 125°C		40	A
V_{CEK}	RBSOA, Clamped inductive load; L = 100 µH		$0.8V_{CES}$	
P_{tot}	T_C = 25°C		250	W

Symbol	Conditions	Characteristic Values (T_{VJ} = 25°C, unless otherwise specified) min.	typ.	max.	
$V_{CE(sat)}$	I_C = 20 A; V_{GE} = 15 V; T_{VJ} = 25°C		6.2	7.1	V
	T_{VJ} = 125°C		6.9		V
$V_{GE(th)}$	I_C = 2 mA; V_{GE} = V_{CE}	4		8	V
I_{CES}	V_{CE} = 0.8V_{CES}; V_{GE} = 0 V; T_{VJ} = 25°C			0.4	mA
	T_{VJ} = 125°C		0.8		mA
I_{GES}	V_{CE} = 0 V; V_{GE} = ± 20 V			500	nA
$t_{d(on)}$	Inductive load, T_{VJ} = 125°C		200		ns
t_r	V_{CE} = 960 V; I_C = 25 A		60		ns
$t_{d(off)}$	V_{GE} = 15/0 V; R_G = 22 Ω		300		ns
t_f			40		ns
C_{ies}	V_{CE} = 25 V; V_{GE} = 0 V; f = 1 MHz		3300		pF
Q_{Gon}	V_{CE} = 600V; V_{GE} = 15 V; I_C = 20 A		130		nC
V_F	(reverse conduction); I_F = 20A		2.5		V
R_{thJC}				0.5	K/W

Features

- High Voltage BIMOSFET™
  - substitute for high voltage MOSFETs with significantly lower voltage drop
  - fast switching for high frequency operation
  - reverse conduction capability
- ISOPLUS i4-PAC™ high voltage package
  - isolated back surface
  - enlarged creepage towards heatsink
  - enlarged creepage between high voltage pins
  - application friendly pinout
  - high reliability
  - industry standard outline

Applications

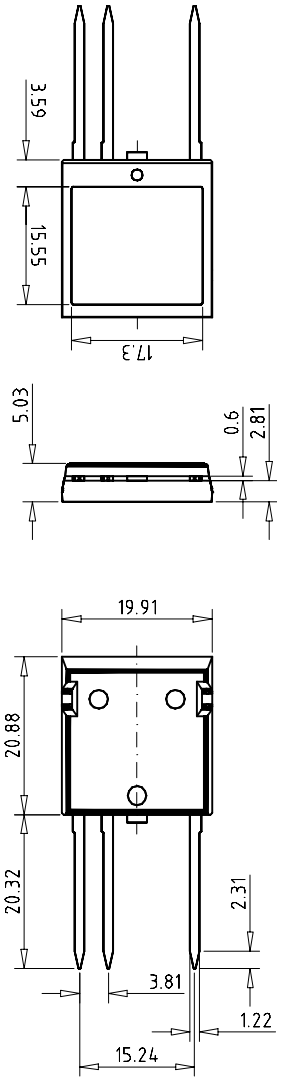
- switched mode power supplies
- DC-DC converters
- resonant converters
- lamp ballasts
- laser generators, x ray generators

Component

Symbol	Conditions	Maximum Ratings	
T_{VJ}		-55...+150	°C
T_{stg}		-55...+125	°C
V_{ISOL}	$I_{ISOL} \leq 1$ mA; 50/60 Hz	2500	V~
F_C	mounting force with clip	20...120	N

Symbol	Conditions	Characteristic Values		
		min.	typ.	max.
d_S,d_A	C pin - E pin	7		mm
d_S,d_A	pin - backside metal	5.5		mm
R_{thCH}	with heatsink compound		0.15	K/W
Weight			9	g

Dimensions in mm (1 mm = 0.0394")



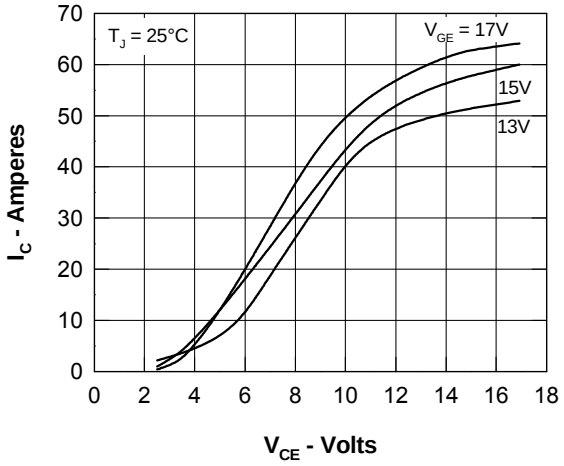


Fig. 1 Typ. Output Characteristics

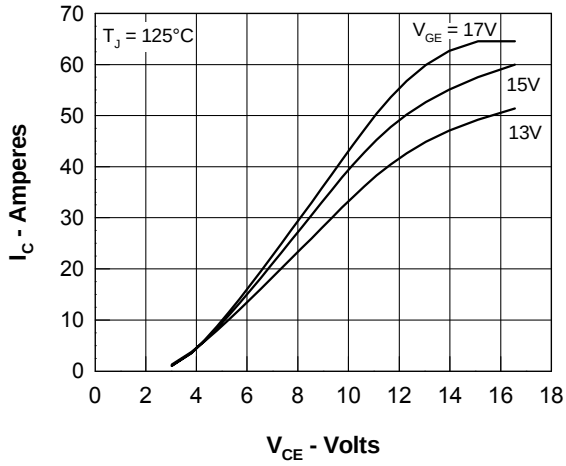


Fig. 2 Typ. Output Characteristics

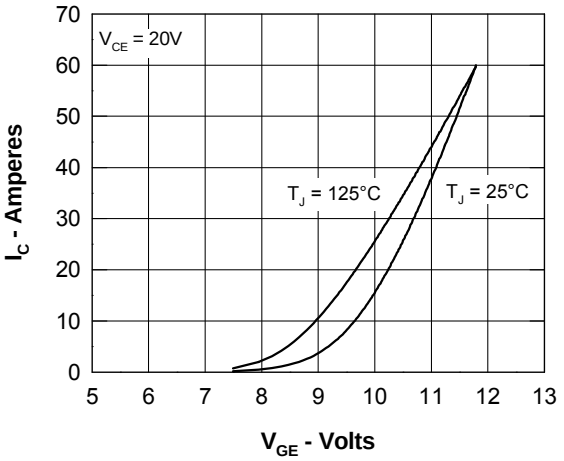


Fig. 3 Typ. Transfer Characteristics

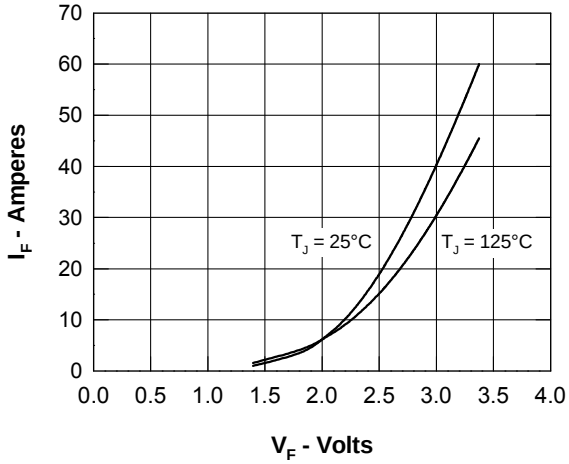


Fig. 4 Typ. Characteristics of Reverse Conduction

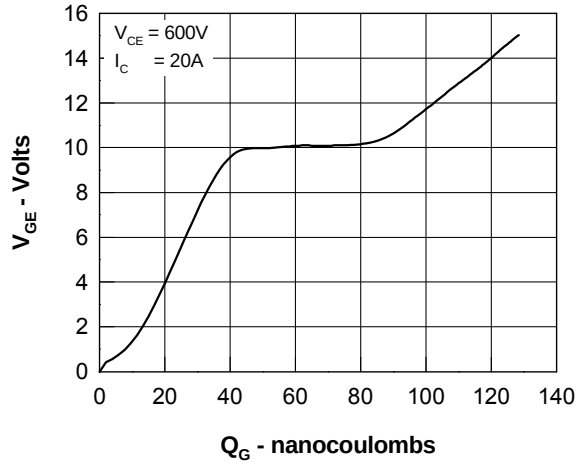


Fig. 5 Typ. Gate Charge characteristics

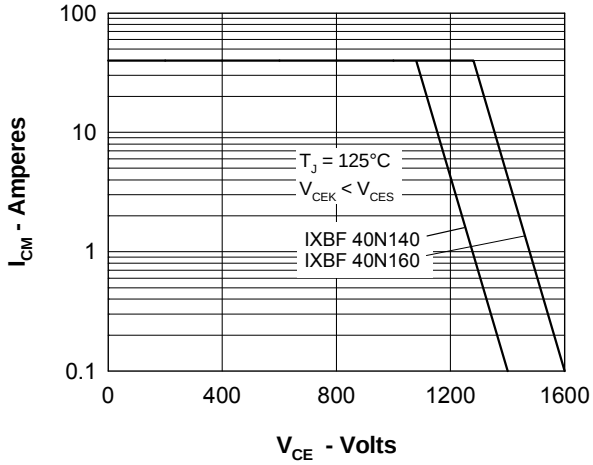


Fig. 6 Reverse Based Safe Operating Area RBSOA

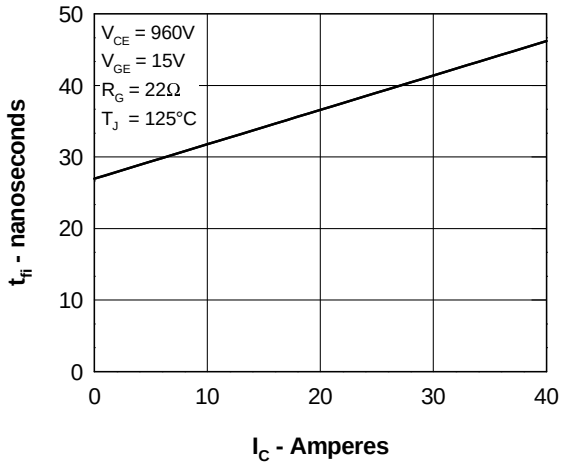


Fig. 7 Typ. Fall Time

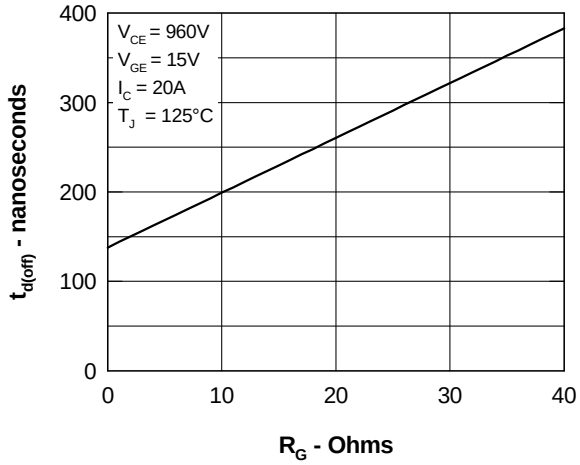


Fig. 8 Typ. Turn Off Delay Time

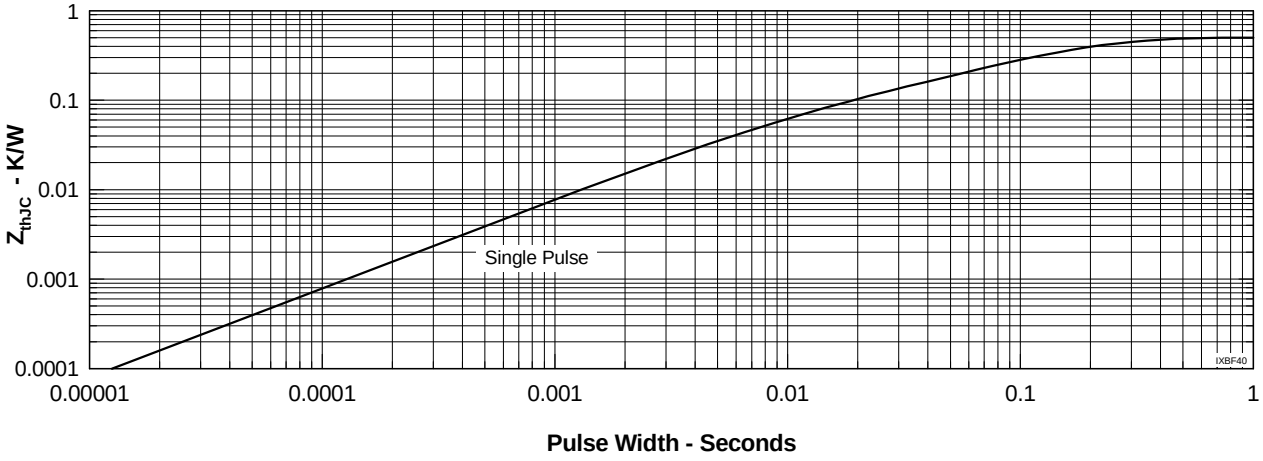


Fig. 9 Typ. Transient Thermal Impedance

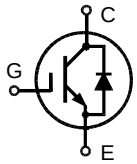
IXYS

High Voltage BIMOSFET™ Monolithic Bipolar MOS Transistor

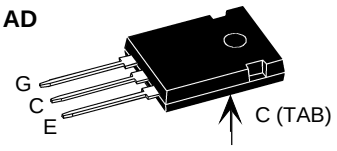
N-Channel, Enhancement Mode

IXBH 40N140
IXBH 40N160

V_{CES} = 1400/1600 V
I_{C25} = 33 A
$V_{CE(sat)}$ = 6.2 V typ.
t_{fi} = 40 ns



TO-247 AD



G = Gate, C = Collector,
E = Emitter, TAB = Collector

Symbol	Conditions	Maximum Ratings 40N140	40N160	
V_{CES}	T_J = 25°C to 150°C	1400	1600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	1400	1600	V
V_{GES}	Continuous		±20	V
V_{GEM}	Transient		±30	V
I_{C25}	T_C = 25°C,		33	A
I_{C90}	T_C = 90°C		20	A
I_{CM}	T_C = 25°C, 1 ms		40	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 22 Ω V_{CE} = 0.8•V_{CES} Clamped inductive load, L = 100 µH		I_{CM} = 40	A
P_C	T_C = 25°C		350	W
T_J			-55 ... +150	°C
T_{JM}			150	°C
T_{stg}			-55 ... +150	°C
T_L	1.6 mm (0.063 in) from case for 10 s		300	°C
M_d	Mounting torque		1.15/10	Nm/lb.in.
Weight			6	g

Symbol	Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 1 mA, V_{GE} = 0 V	40N140	1400			V
		40N160	1600			V
$V_{GE(th)}$	I_C = 2 mA, V_{CE} = V_{GE}		4		8	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			400	µA
	V_{GE} = 0 V	T_J = 125°C			3	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				± 500	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V			6.2	7.1	V
		T_J = 125°C			7.8	V

Features

- International standard package JEDEC TO-247 AD
- High Voltage BIMOSFET™
  - replaces high voltage Darlingtons and series connected MOSFETs
  - lower effective $R_{DS(on)}$
- Monolithic construction
  - high blocking voltage capability
  - very fast turn-off characteristics
- MOS Gate turn-on
  - drive simplicity
- Intrinsic diode

Applications

- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- CRT deflection
- Lamp ballasts

Advantages

- Easy to mount with 1 screw (isolated mounting screw hole)
- Space savings
- High power density

IXYS reserves the right to change limits, test conditions and dimensions.

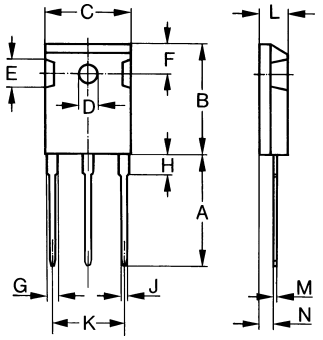
031

Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		3300		pF
C_{oes}			220		pF
C_{res}			30		pF
Q_g	I_C = 20 A, V_{CE} = 600 V, V_{GE} = 15 V		130		nC
$t_{d(on)}$	**Inductive load, T_J = 125°C**		200		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH,		60		ns
$t_{d(off)}$	V_{CE} = 960 V, R_G = 22 Ω		270		ns
t_{fi}			40		ns
R_{thJC}				0.35	K/W
R_{thCK}			0.25		K/W

Reverse Conduction

Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	$I_F = I_{C90}$, V_{GE} = 0 V, Pulse test, t ≤ 300 µs, duty cycle d ≤ 2 %		2.5	5	V

TO-247 AD Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

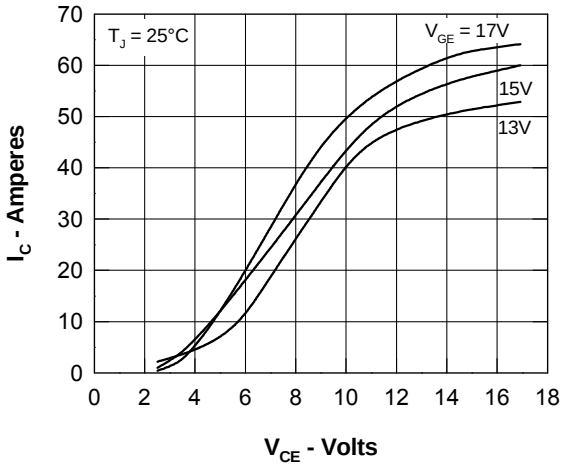


Fig. 1 Typ. Output Characteristics

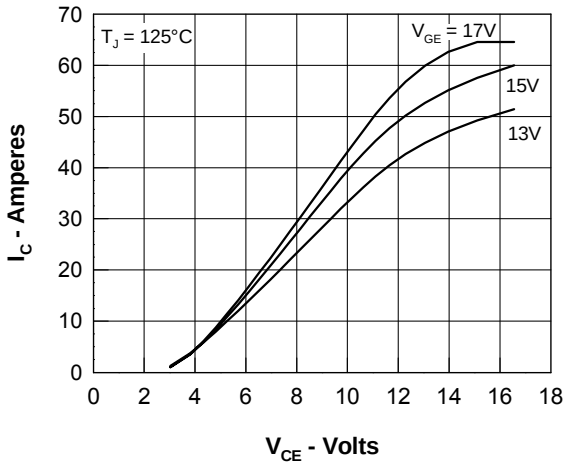


Fig. 2 Typ. Output Characteristics

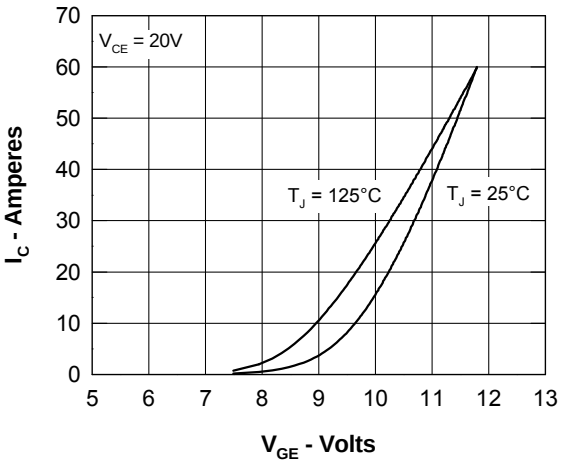


Fig. 3 Typ. Transfer Characteristics

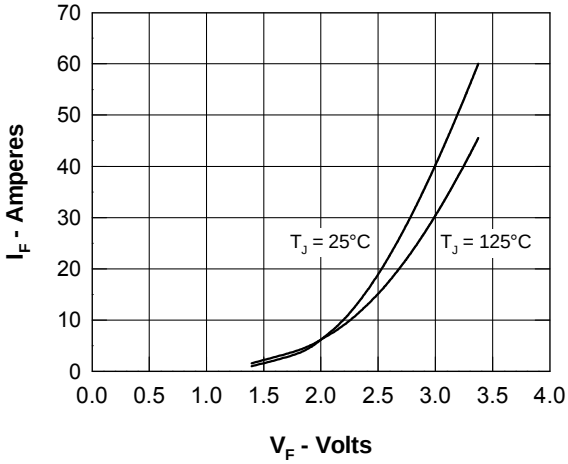


Fig. 4 Typ. Characteristics of Reverse Conduction

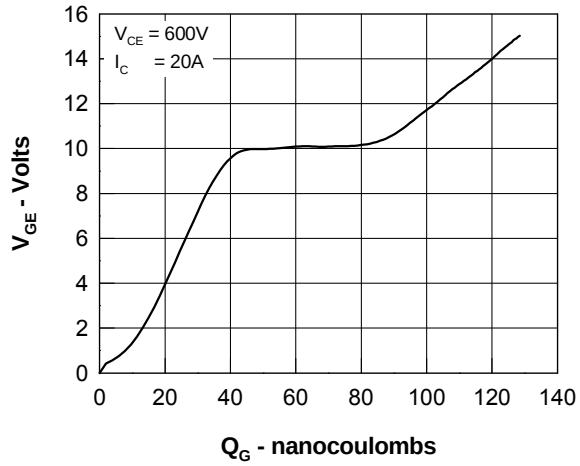


Fig. 5 Typ. Gate Charge characteristics

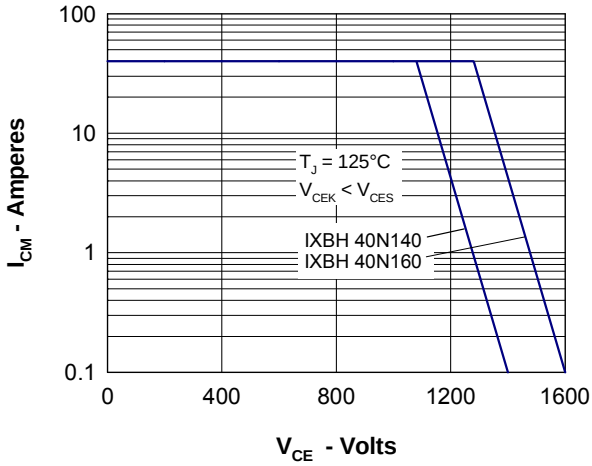


Fig. 6 Reverse Based Safe Operating Area RBSOA

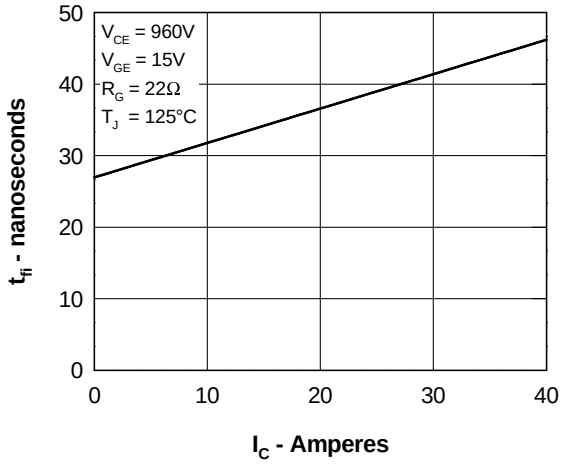


Fig. 7 Typ. Fall Time

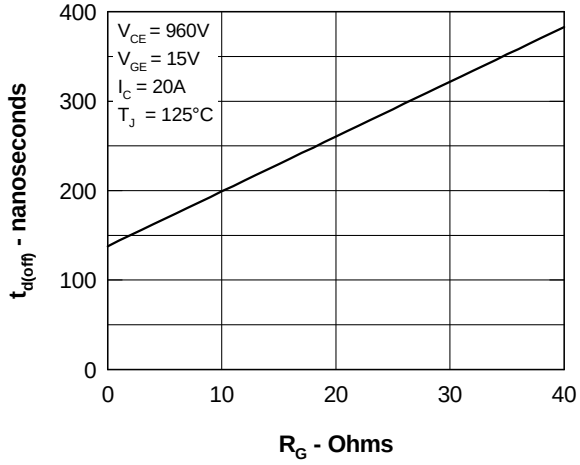


Fig. 8 Typ. Turn Off Delay Time

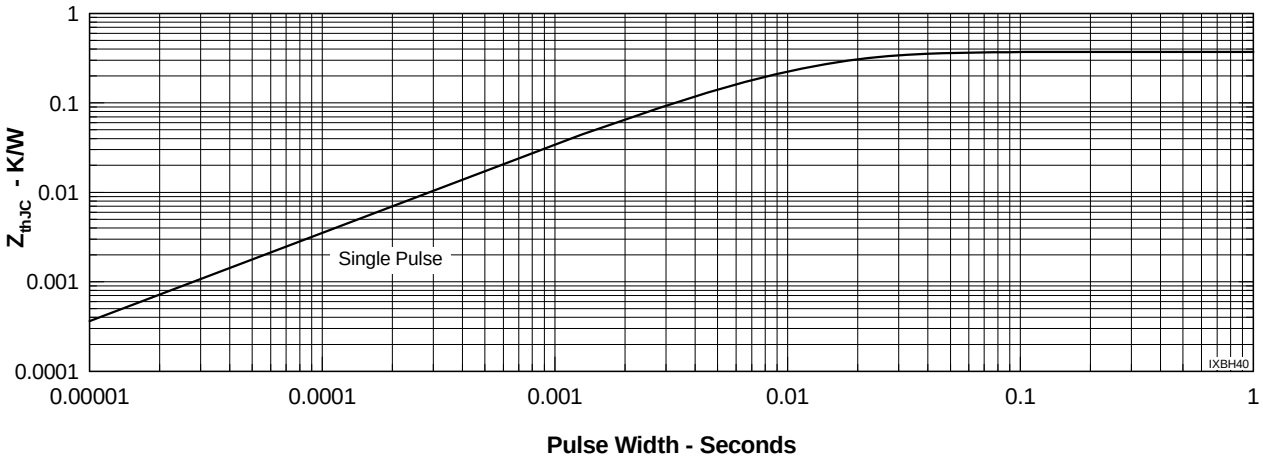


Fig. 9 Typ. Transient Thermal Impedance

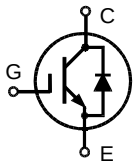
IXYS

High Voltage BIMOSFET™ Monolithic Bipolar MOS Transistor

IXBJ 40N140
IXBJ 40N160

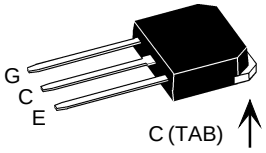
V_{CES} = 1400/1600 V
I_{C25} = 33 A
$V_{CE(sat)}$ = 7.1 V
t_{fi} = 40 ns

N-Channel, Enhancement Mode



Symbol	Test Conditions	Maximum Ratings		
		40N140	40N160	
V_{CES}	T_J = 25°C to 150°C	1400	1600	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MW	1400	1600	V
V_{GES}	Continuous		±20	V
V_{GEM}	Transient		±30	V
I_{C25}	T_C = 25°C,		33	A
I_{C90}	T_C = 90°C		20	A
I_{CM}	T_C = 25°C, 1 ms		40	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 22 Ω; V_{CE} = 0.8 V_{CES} Clamped inductive load, L = 100 mH		I_{CM} = 40	A
P_C	T_C = 25°C		350	W
T_J			-55 ... +150	°C
T_{JM}			150	°C
T_{stg}			-55 ... +150	°C
T_L	1.6 mm (0.063 in) from case for 10 s		300	°C
M_d	Mounting torque		1.15/10	Nm/lb.in.
Weight			6	g

TO-268



G = Gate C = Collector
E = Emitter TAB = Collector

Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 1 mA, V_{GE} = 0 V	40N140	1400			V
		40N160	1600			V
$V_{GE(th)}$	I_C = 2 mA, V_{CE} = V_{GE}		4		8	V
I_{CES}	V_{CE} = 0.8 • V_{CES}	T_J = 25°C			400	µA
	V_{GE} = 0 V	T_J = 125°C			3	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				± 500	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V			6.2	7.1	V
		T_J = 125°C			7.8	V

Features

- Leaded TO-268 package
- High Voltage BIMOSFET™
  - replaces high voltage Darlingtons and series connected MOSFETs
  - lower effective $R_{DS(on)}$
- Monolithic construction
  - high blocking voltage capability
  - very fast turn-off characteristics
- MOS Gate turn-on
  - drive simplicity
- Intrinsic diode

Applications

- AC motor speed control
- DC servo and robot drives
- DC choppers
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- CRT deflection
- Lamp ballasts

Advantages

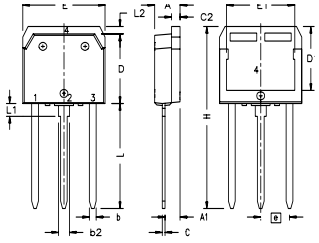
- Space savings
- High power density

Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		3300		pF
C_{oes}			220		pF
C_{res}			30		pF
Q_g	I_C = 20 A, V_{CE} = 600 V, V_{GE} = 15 V		130		nC
$t_{d(on)}$	**Inductive load, T_J = 125°C**		200		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V, L = 100 µH		60		ns
$t_{d(off)}$	V_{CE} = 960 V, R_G = 22 Ω		270		ns
t_{fi}			40		ns
R_{thJC}				0.35	K/W
R_{thCK}			0.25		K/W

Reverse Conduction

Symbol	Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	$I_F = I_{C90}$, V_{GE} = 0 V, Pulse test, t ≤ 300 ms, duty cycle d ≤ 2 %		2.5	5	V

Leaded TO-268



All metal area are solder plated
1 - gate
2 - drain (collector)
3 - source (emitter)
4 - drain (collector)

Dim.	Inches Min	Max	Millimeters Min	Max
A	.193	.201	4.90	5.10
A1	.106	.114	2.70	2.90
b	.045	.057	1.15	1.45
b2	.075	.083	1.90	2.10
C	.016	.026	.040	.065
C2	.057	.063	1.45	1.60
D	.543	.551	13.80	14.00
D1	.488	.500	12.40	12.70
E	.624	.632	15.85	16.05
E1	.524	.535	13.30	13.60
e	.215 BSC		5.45 BSC	
H	1.365	1.395	34.67	35.43
L	.780	.800	19.81	20.32
L1	.079	.091	2.00	2.30
L2	.039	.045	1.00	1.15

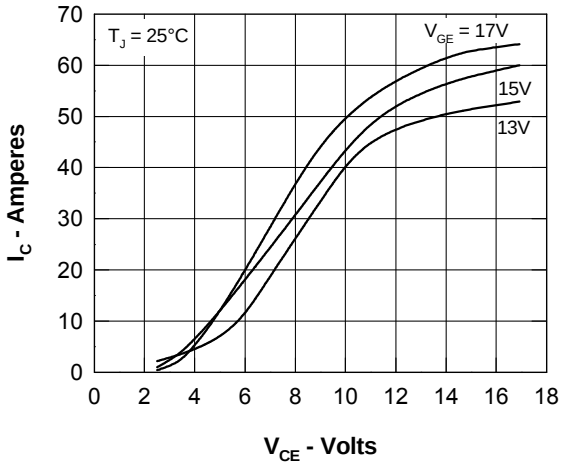


Fig. 1 Output Characteristics

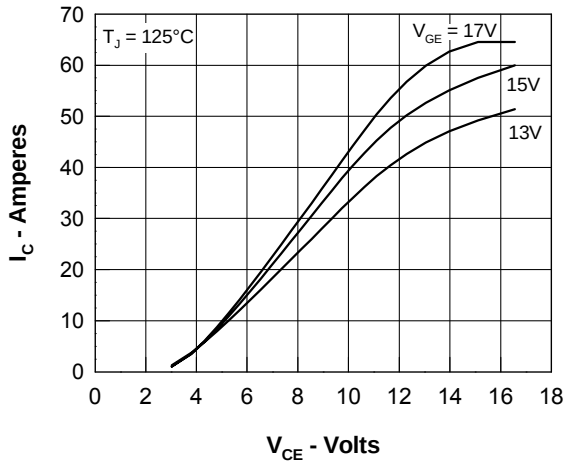


Fig. 2 High Temperature Output Chacteristics

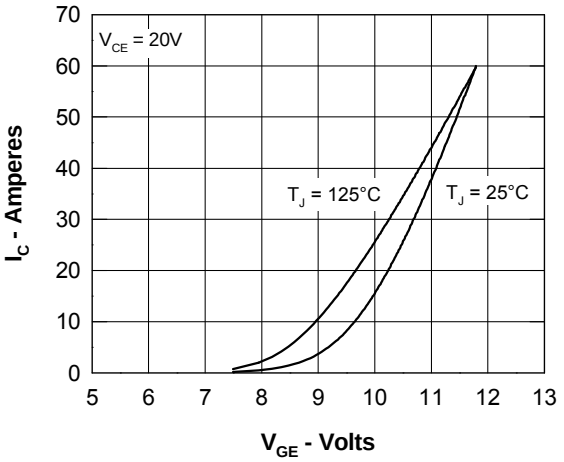


Fig. 3 Transfer Characteristics

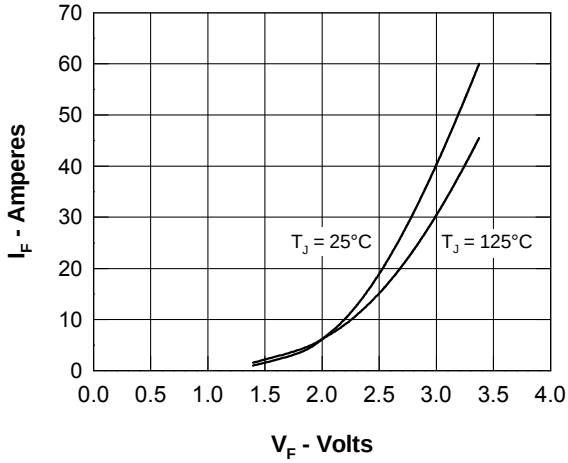


Fig. 4 Forward voltage drop of the Intrinsic Diode

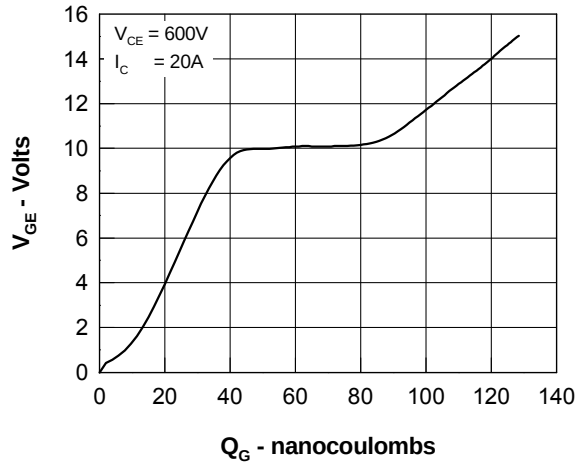


Fig. 5 Gate Charge Characteristics

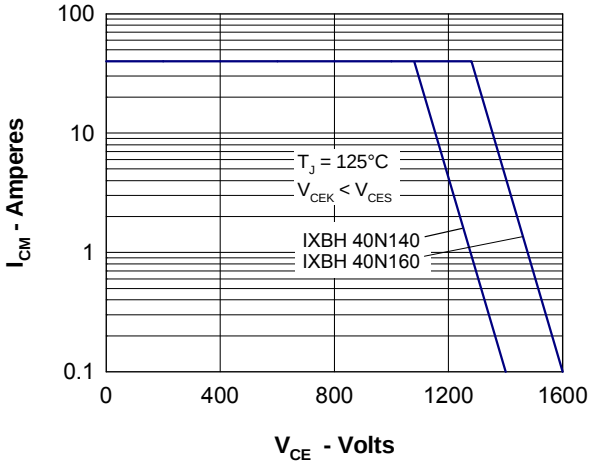


Fig. 6 Reverse Based Safe Operating Area

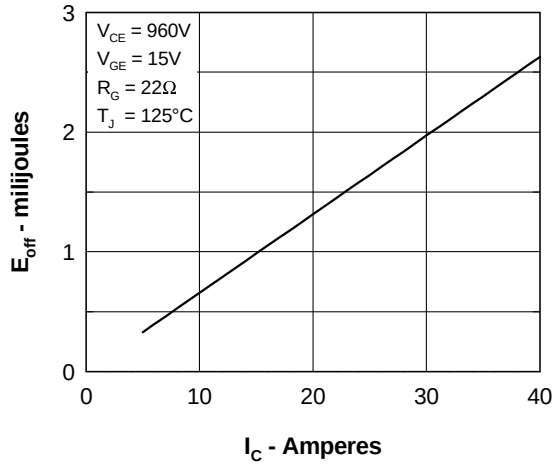


Fig. 7 Turn off Energy vs. Collector Current

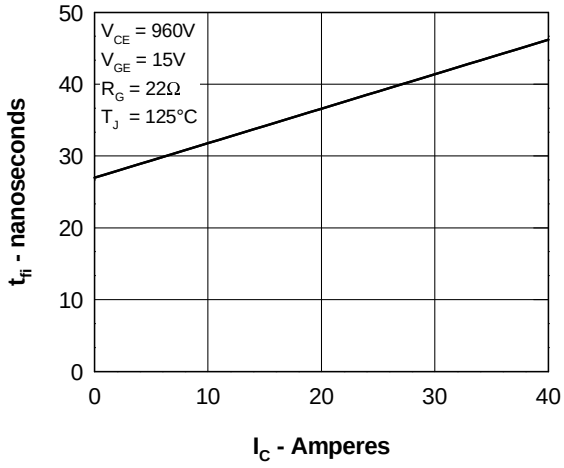


Fig. 8 Collector Current Fall Time

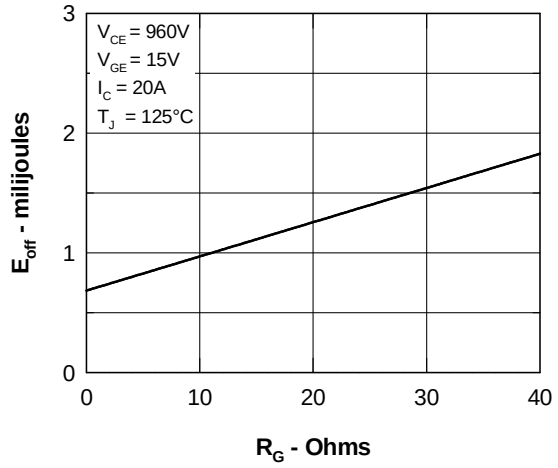


Fig. 9 Turn-off Energy vs. Gate Resistance

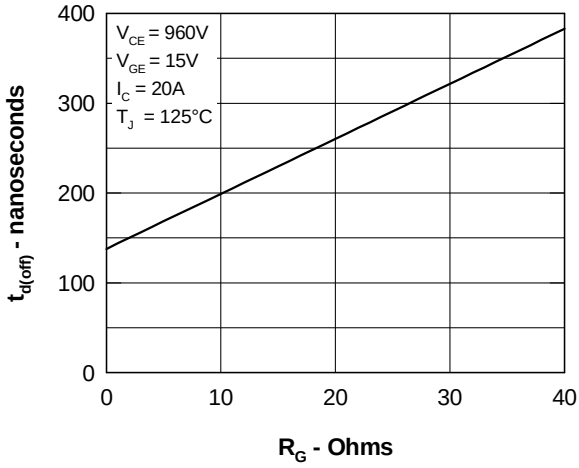


Fig.10 Turn Off Delay Time vs. Gate Resistance

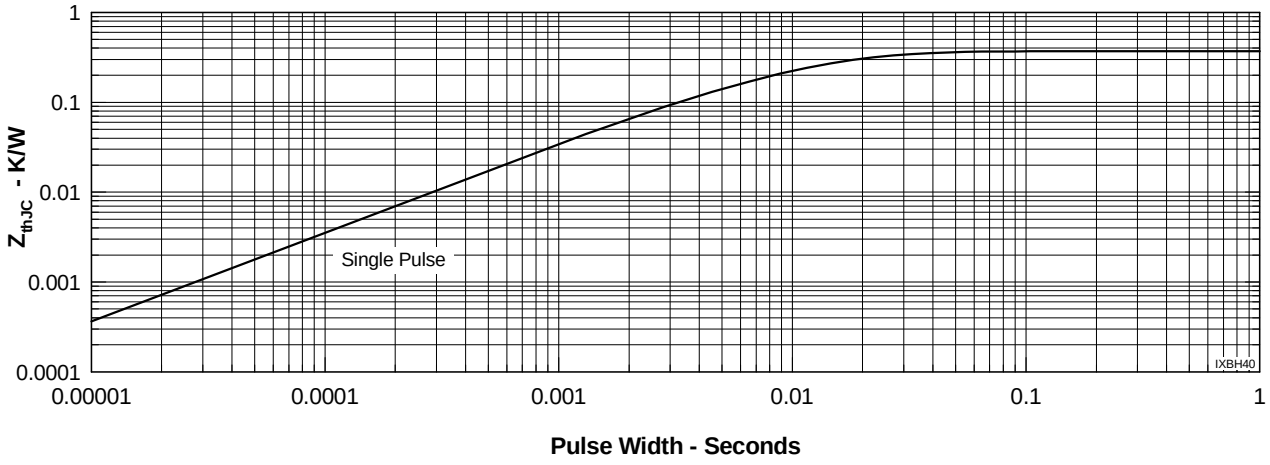
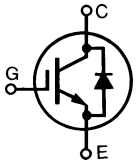


Fig.11 Transient Thermal Impedance

High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

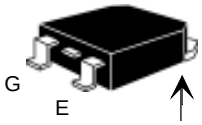
IXBH 16N170A
IXBT 16N170A

V_{CES} = 1700 V
I_{C25} = 16 A
$V_{CE(sat)}$ = 6.0 V
$t_{fi(typ)}$ = 50 ns

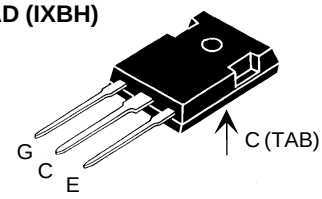


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1700	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	1700	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	16	A
I_{C90}	T_C = 90°C	10	A
I_{CM}	T_C = 25°C, 1 ms	40	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 33 Ω Clamped inductive load	I_{CM} = 40 V_{CES} = 1350	A V
t_{SC} (SCSOA)	V_{GE} = 15 V, V_{CES} = 1200V, T_J = 125°C R_G = 33 Ω non repetitive	10	µs
P_C	T_C = 25°C	150	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Maximum Lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C
Maximum tab temperature for soldering SMD devices for 10 s		260	°C
M_d	Mounting torque (M3) (TO-247)	1.13/10	Nm/lb.in.
Weight	TO-247	6	g
	TO-268	4	g

TO-268 (IXBT)



TO-247 AD (IXBH)



G = Gate, C = Collector,
E = Emitter, TAB = Collector

Features

- Monolithic fast reverse diode
- High Blocking Voltage
- JEDEC TO-268 surface mount and JEDEC TO-247 AD packages
- Low switching losses
- High current handling capability
- MOS Gate turn-on
  - drive simplicity
- Molding epoxies meet UL 94 V-0 flammability classification

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 250 µA, V_{GE} = 0 V	1700			V
$V_{GE(th)}$	I_C = 250 µA, V_{CE} = V_{GE}	2.5		5.5	V
I_{CES}	V_{CE} = 0.8 V_{CES}			50	µA
	V_{GE} = 0 V; Note 1 T_J = 125°C			1.5	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V			±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V			6.0	V
	Note 2 T_J = 125°C		5.0		V

Applications

- AC motor speed control
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- Capacitor discharge circuits

Advantages

- Lower conduction losses than MOSFETs
- High power density
- Suitable for surface mounting
- Easy to mount with 1 screw, (isolated mounting screw hole)

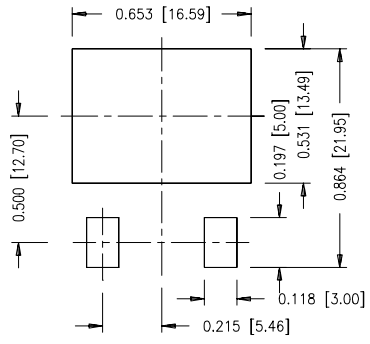
Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	8	12.5		S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		1400		pF
C_{oes}			90		pF
C_{res}			31		pF
Q_g	$I_C = I_{C90}$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		65		nC
Q_{ge}			13		nC
Q_{gc}			22		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		15		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V		25		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 10 Ω		160	250	ns
t_{fi}	Remarks: Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		50	100	ns
E_{off}			1.2	2.5	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		15		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V		28		ns
E_{on}	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 10 Ω		2.0		mJ
$t_{d(off)}$	Remarks: Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		220		ns
t_{fi}			150		ns
E_{off}			2.6		mJ
R_{thJC}				0.83	K/W
R_{thCK}	(TO-247)		0.25		K/W

Reverse Diode

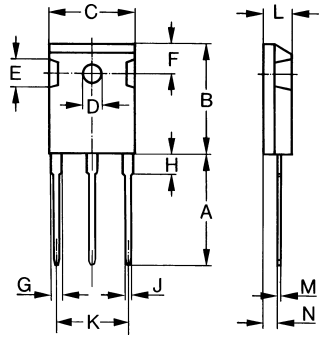
Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	$I_F = I_{C90}$, V_{GE} = 0 V, Pulse test, t ≤ 300 us, duty cycle d ≤ 2%			5.0	V
I_{RM}	$I_F = I_{C90}$, V_{GE} = 0 V, $-di_F/dt$ = 50 A/us		10		A
t_{rr}	v_R = 100V		360		ns

Notes:
1. Device must be heatsunk for high temperature leakage current measurements to avoid thermal runaway.
2. Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %.

Min. Recommended Footprint

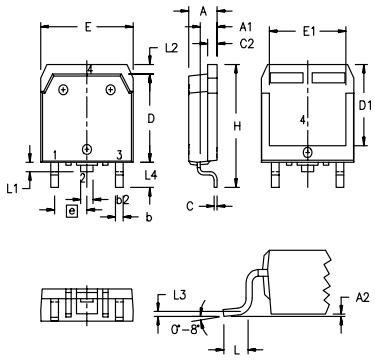


TO-247 AD Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

TO-268AA (D^3 PAK)

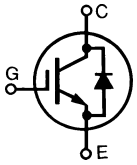


Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.9	5.1	.193	.201
A_1	2.7	2.9	.106	.114
A_2	.02	.25	.001	.010
b	1.15	1.45	.045	.057
b_2	1.9	2.1	.75	.83
C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E_1	13.3	13.6	.524	.535
e	5.45 BSC		.215 BSC	
H	18.70	19.10	.736	.752
L	2.40	2.70	.094	.106
L1	1.20	1.40	.047	.055
L2	1.00	1.15	.039	.045
L3	0.25 BSC		.010 BSC	
L4	3.80	4.10	.150	.161

High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

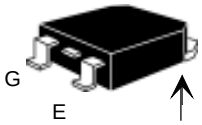
IXBH 16N170
IXBT 16N170

V_{CES} = 1700 V
I_{C25} = 25 A
$V_{CE(sat)}$ = 3.3 V

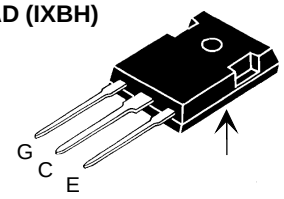


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1700	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	1700	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	25	A
I_{C90}	T_C = 90°C	16	A
I_{CM}	T_C = 25°C, 1 ms	40	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 33 Ω Clamped inductive load	I_{CM} = 40 V_{CES} = 1350	A V
P_C	T_C = 25°C	150	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Maximum Lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C
Maximum Tab temperature for soldering SMD devices for 10 s		260	°C
M_d	Mounting torque (M3)	1.13/10	Nm/lb.in.
Weight	TO-247 AD	6	g
	TO-268	4	g

TO-268 (IXBT)



TO-247 AD (IXBH)



G = Gate, C = Collector,
E = Emitter, TAB = Collector

Features

- High Blocking Voltage
- JEDEC TO-268 surface and JEDEC TO-247 AD
- Low conduction losses
- High current handling capability
- MOS Gate turn-on
  - drive simplicity
- Molding epoxies meet UL 94 V-0 flammability classification

Applications

- AC motor speed control
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- Capacitor discharge circuits

Advantages

- High power density
- Suitable for surface mounting
- Easy to mount with 1 screw, (isolated mounting screw hole)

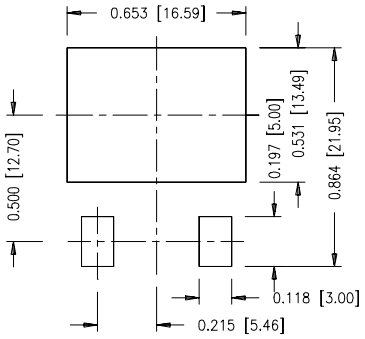
Symbol	Test Conditions		Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 250 μA, V_{GE} = 0 V		1700			V
$V_{GE(th)}$	I_C = 250 μA, V_{CE} = V_{GE}		2.5		5	V
I_{CES}	V_{CE} = 0.8 V_{CES}	T_J = 25°C			50	μA
	V_{GE} = 0 V	T_J = 125°C			1.5	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V				±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V				3.3	V
		T_J = 125°C		2.9		V

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	11	14		S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		1700		pF
C_{oes}			83		pF
C_{res}			31		pF
Q_g	$I_C = I_{C90}$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		69		nC
Q_{ge}			13		nC
Q_{gc}			24		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		35		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V		25		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 33 Ω		600	1000	ns
t_{fi}	Remarks: Switching times may		1110	1600	ns
E_{off}	increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		12	16	mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		35		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V		28		ns
E_{on}	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 33 Ω		2.0		mJ
$t_{d(off)}$	Remarks: Switching times may		660		ns
t_{fi}	increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		1600		ns
E_{off}			15		mJ
R_{thJC}				0.83	K/W
R_{thCK}	(TO-247)		0.25		K/W

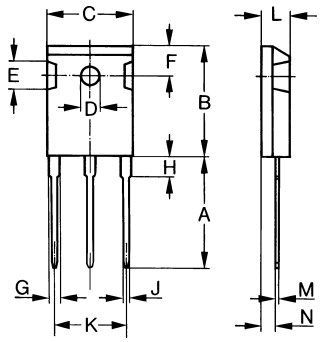
Reverse Diode

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	$I_F = I_{C90}$, V_{GE} = 0 V, Pulse test, t ≤ 300 us, duty cycle d ≤ 2%			3.3	V
I_{RM}	$I_F = I_{C90}$, V_{GE} = 0 V, -di_F/dt = 50 A/us		24		A
t_{rr}	v_R = 100A		360		ns

Min. Recommended Footprint

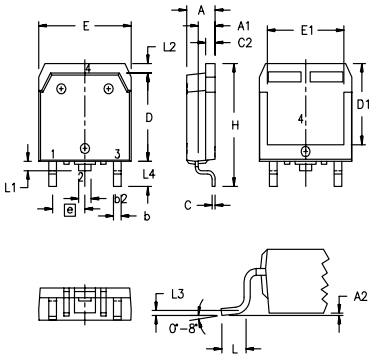


TO-247 AD Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	19.81	20.32	0.780	0.800
B	20.80	21.46	0.819	0.845
C	15.75	16.26	0.610	0.640
D	3.55	3.65	0.140	0.144
E	4.32	5.49	0.170	0.216
F	5.4	6.2	0.212	0.244
G	1.65	2.13	0.065	0.084
H	-	4.5	-	0.177
J	1.0	1.4	0.040	0.055
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

TO-268AA (D^3 PAK)

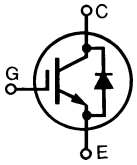


Dim.	Millimeter Min.	Max.	Inches Min.	Max.
A	4.9	5.1	.193	.201
A_1	2.7	2.9	.106	.114
A_2	.02	.25	.001	.010
b	1.15	1.45	.045	.057
b_2	1.9	2.1	.75	.83
C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E_1	13.3	13.6	.524	.535
e	5.45 BSC		.215 BSC	
H	18.70	19.10	.736	.752
L	2.40	2.70	.094	.106
L1	1.20	1.40	.047	.055
L2	1.00	1.15	.039	.045
L3	0.25 BSC		.010 BSC	
L4	3.80	4.10	.150	.161

High Voltage, High Gain BIMOSFET™ Monolithic Bipolar MOS Transistor

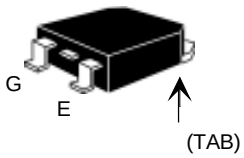
IXBH 42N170
IXBT 42N170

V_{CES} = 1700 V
I_{C25} = 75 A
$V_{CE(sat)}$ = 3.3 V

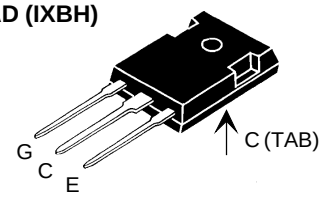


Symbol	Test Conditions	Maximum Ratings	
V_{CES}	T_J = 25°C to 150°C	1700	V
V_{CGR}	T_J = 25°C to 150°C; R_{GE} = 1 MΩ	1700	V
V_{GES}	Continuous	±20	V
V_{GEM}	Transient	±30	V
I_{C25}	T_C = 25°C	75	A
I_{C90}	T_C = 90°C	42	A
I_{CM}	T_C = 25°C, 1 ms	180	A
SSOA (RBSOA)	V_{GE} = 15 V, T_{VJ} = 125°C, R_G = 10 Ω Clamped inductive load	I_{CM} = 90 V_{CES} = 1350	A V
t_{SC} (SCSOA)	V_{GE} = 15 V, V_{CES} = 1200V, T_J = 125°C R_G = 10 Ω non repetitive	10	µs
P_C	T_C = 25°C	300	W
T_J		-55 ... +150	°C
T_{JM}		150	°C
T_{stg}		-55 ... +150	°C
Maximum Lead temperature for soldering 1.6 mm (0.062 in.) from case for 10 s		300	°C
Maximum Tab temperature for soldering SMD devices for 10 s		260	°C
M_d	Mounting torque (M3)	1.13/10	Nm/lb.in.
Weight	TO-247 AD TO-268	6 4	g g

TO-268 (IXBT)



TO-247 AD (IXBH)



G = Gate, C = Collector,
E = Emitter, TAB = Collector

Features
- High Blocking Voltage
- JEDEC TO-268 surface and JEDEC TO-247 AD
- Low conduction losses
- High current handling capability
- MOS Gate turn-on
  - drive simplicity
- Molding epoxies meet UL 94 V-0 flammability classification

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
BV_{CES}	I_C = 250 µA, V_{GE} = 0 V	1700			V
$V_{GE(th)}$	I_C = 750 µA, V_{CE} = V_{GE}	2.5		5.5	V
I_{CES}	V_{CE} = 0.8 V_{CES}, T_J = 25°C			50	µA
	V_{GE} = 0 V, T_J = 125°C			1.5	mA
I_{GES}	V_{CE} = 0 V, V_{GE} = ±20 V			±100	nA
$V_{CE(sat)}$	I_C = I_{C90}, V_{GE} = 15 V			3.3	V
	T_J = 125°C		2.9		V

Applications
- AC motor speed control
- Uninterruptible power supplies (UPS)
- Switched-mode and resonant-mode power supplies
- Capacitor discharge circuits

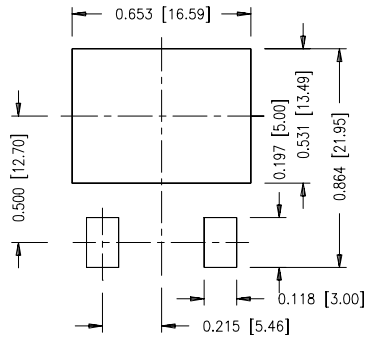
Advantages
- Lower conduction losses than MOSFETs
- High power density
- Suitable for surface mounting
- Easy to mount with 1 screw, (isolated mounting screw hole)

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
g_{fs}	$I_C = I_{C90}$; V_{CE} = 10 V, Pulse test, t ≤ 300 µs, duty cycle ≤ 2 %	25	40		S
C_{ies}	V_{CE} = 25 V, V_{GE} = 0 V, f = 1 MHz		4700		pF
C_{oes}			213		pF
C_{res}			76		pF
Q_g	$I_C = I_{C90}$, V_{GE} = 15 V, V_{CE} = 0.5 V_{CES}		169		nC
Q_{ge}			30		nC
Q_{gc}			52		nC
$t_{d(on)}$	**Inductive load, T_J = 25°C**		45		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V		35		ns
$t_{d(off)}$	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 10 Ω		400		ns
t_{fi}	Remarks: Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		1500		ns
E_{off}			36		mJ
$t_{d(on)}$	**Inductive load, T_J = 125°C**		45		ns
t_{ri}	$I_C = I_{C90}$, V_{GE} = 15 V		38		ns
E_{on}	V_{CE} = 0.8 V_{CES}, $R_G = R_{off}$ = 10 Ω		50		mJ
$t_{d(off)}$	Remarks: Switching times may increase for V_{CE} (Clamp) > 0.8 • V_{CES}, higher T_J or increased R_G		560		ns
t_{fi}			1900		ns
E_{off}			45		mJ
R_{thJC}				0.42	K/W
R_{thCK}	(TO-247)		0.25		K/W

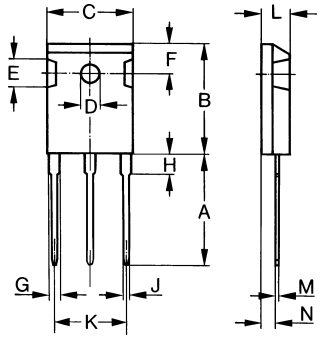
Reverse Diode

Symbol	Test Conditions	Characteristic Values (T_J = 25°C, unless otherwise specified) min.	typ.	max.	
V_F	$I_F = I_{C90}$, V_{GE} = 0 V, Pulse test, t ≤ 300 us, duty cycle d ≤ 2%			4.0	V
I_{RM}	I_F = 25A, V_{GE} = 0 V, $-di_F/dt$ = 50 A/us		24		A
t_{rr}	v_R = 100V		360		ns

Min. Recommended Footprint



TO-247 AD Outline



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
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E	4.32	5.49	0.170	0.216
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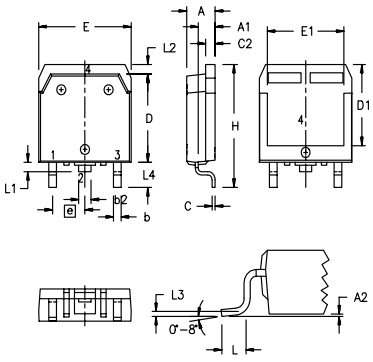
K	10.8	11.0	0.426	0.433
L	4.7	5.3	0.185	0.209
M	0.4	0.8	0.016	0.031
N	1.5	2.49	0.087	0.102

TO-268AA (D^3 PAK)



Dim.	Millimeter Min.	Max.	Inches Min.	Max.
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C	.4	.65	.016	.026
D	13.80	14.00	.543	.551
E	15.85	16.05	.624	.632
E_1	13.3	13.6	.524	.535
e	5.45 BSC		.215 BSC	
H	18.70	19.10	.736	.752
L	2.40	2.70	.094	.106
L1	1.20	1.40	.047	.055
L2	1.00	1.15	.039	.045
L3	0.25 BSC		.010 BSC	
L4	3.80	4.10	.150	.161