

GP1600FSS12S

POWERLINE N-CHANNEL IGBT MODULE

APPLICATIONS

- High Power Switching.
- Motor Control.
- UPS.
- AC And DC Servo Drive Amplifiers.

FEATURES

- n - Channel.
- Enhancement Mode.
- High Input Impedance.
- High Switching Speed.
- Latch-Free Operation.
- Low Forward Voltage Drop.
- Isolated Base.
- Short Circuit Capability (10μs).

CIRCUIT

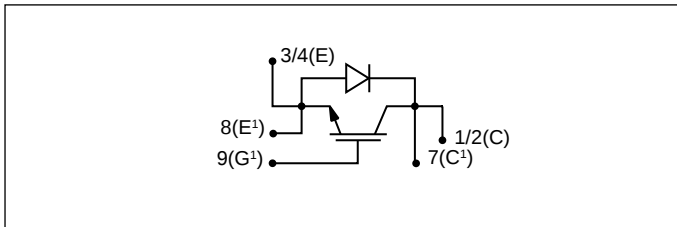


Fig.1 Single switch circuit diagram

RATINGS

$T_{case} = 25^{\circ}C$ unless stated otherwise.				
Symbol	Parameter	Test Conditions	Max.	Units
V_{CES}	Collector-emitter voltage	$V_{GE} = 0V$	1200	V
V_{GES}	Gate-emitter voltage	-	±20	V
I_C	Collector current	DC, $T_{case} = 75^{\circ}C$	1600	A
$I_{C(PK)}$		1ms, $T_{case} = 75^{\circ}C$	3200	A
P_{max}	Maximum power dissipation		10000	W
V_{isol}	Isolation voltage	Commoned terminals to base plate. AC RMS, 1 min, 50Hz	2500	V

TYPICAL KEY PARAMETERS

V_{CES}	1200V
$V_{CE(sat)}$	2.8V
$I_{C(CONT)}$	1600A
$I_{C(PK)}$	3200A
t_r	190ns
t_f	840ns

PACKAGE OUTLINE

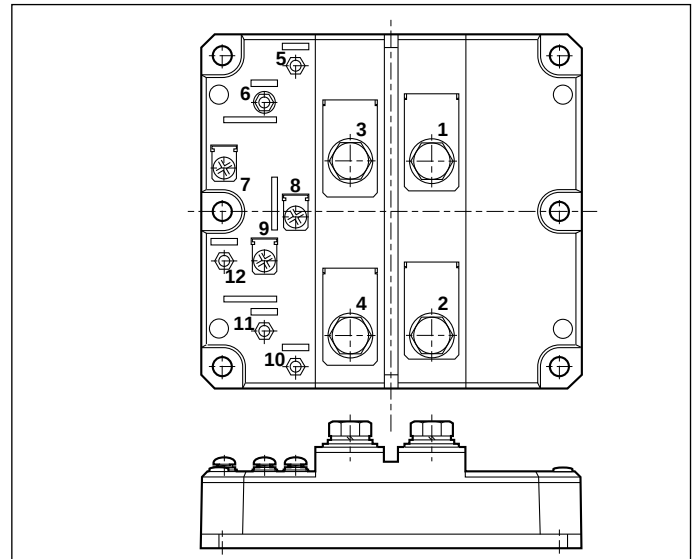


Fig.2

Outline type code: F. See package details for further information.

THERMAL AND MECHANICAL RATINGS

Symbol	Parameter	Conditions	Min.	Max.	Units
$R_{th(j-c)}$	Thermal resistance	DC junction to case	-	0.0125	°C/W
$R_{th(c-h)}$	Thermal resistance - Case to heatsink	Mounting torque 5Nm (with mounting grease)	-	0.002	°C/W
T_j	Junction temperature	-	-	150	°C
T_{stg}	Storage temp. range	-	-40	150	°C
-	Screw torque (mounting)	-	-	6.0	Nm

DC ELECTRICAL CHARACTERISTICS

$T_{case} = 25^{\circ}C$ unless stated otherwise.						
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_{CES}	Collector cut-off current	$V_{GE} = 0V, V_{CE} = V_{CES}$	-	-	16	mA
I_{GES}	Gate leakage current	$V_{GE} = \pm 20V, V_{CE} = 0V$	-	-	± 8	μA
$V_{GE(TH)}$	Gate threshold voltage	$I_C = 80mA, V_{GE} = V_{CE}$	4	-	7.5	V
$V_{CE(SAT)}$	Collector-emitter saturation voltage	$V_{GE} = 15V, I_C = 1600A$	-	2.8	3.6	V
		$V_{GE} = 15V, I_C = 1600A, T_{case} = 125^{\circ}C$	-	3.0	3.6	V

DIODE DC CHARACTERISTICS

$T_{case} = 25^{\circ}C$ unless stated otherwise.						
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_F	Diode forward current	DC, $T_{case} = 75^{\circ}C$	-	-	1120	A
I_{FM}	Diode maximum forward current	$T_{case} = 75^{\circ}C, t_p = 1ms$	-	-	3200	A
V_F	Diode forward voltage	$I_F = 1600A$	-	2.25	2.7	V
$R_{th(j-c)}$	Thermal resistance	DC junction to case	-	-	0.042	°C/W

AC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
C_{ies}	Input capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$	-	216000	-	pF
C_{oes}	Output capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$	-	12000	-	pF
C_{res}	Reverse transfer capacitance	$V_{CE} = 25V, V_{GE} = 0V, f = 1MHz$	-	14400	-	pF

INDUCTIVE SWITCHING CHARACTERISTICS

For definition of switching waveforms, refer to figures 6 and 7 shown in application note AN4504 IGBT Ratings and Characteristics.

$T_{\text{case}} = 125^{\circ}\text{C}$ unless stated otherwise.						
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
$t_{\text{d(off)}}$	Turn-off delay time	$I_{\text{C}} = 1600\text{A},$ $V_{\text{GE}} = \pm 15\text{V},$ $V_{\text{CE}} = 50\% V_{\text{CES}},$ $R_{\text{G(ON)}} = R_{\text{G(OFF)}} = 0.4\Omega$	-	620	-	ns
t_{f}	Fall time		-	840	-	ns
E_{OFF}	Turn-off energy loss		-	448	-	mJ
$t_{\text{d(on)}}$	Turn-on delay time		-	750	-	ns
t_{r}	Rise time		-	190	-	ns
E_{ON}	Turn-on energy loss		-	448	-	mJ

DIODE DYNAMIC CHARACTERISTICS (INDUCTIVE)

$T_{\text{case}} = 125^{\circ}\text{C}$ unless stated otherwise.						
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
t_{rr}	Reverse recovery time	$T_{\text{case}} = 25^{\circ}\text{C}, I_{\text{F}} = 1600\text{A}$ $V_{\text{R}} = 50\% V_{\text{CES}}, dI_{\text{F}}/dt = 4800\text{A}/\mu\text{s}$	-	110	-	ns
Q_{rr}	Reverse recovery charge		-	64	-	μC
t_{rr}	Reverse recovery time	$I_{\text{F}} = 1600\text{A}$ $V_{\text{R}} = 50\% V_{\text{CES}}, dI_{\text{F}}/dt = 4800\text{A}/\mu\text{s}$	-	240	-	ns
Q_{rr}	Reverse recovery charge		-	190	-	μC

CURVES

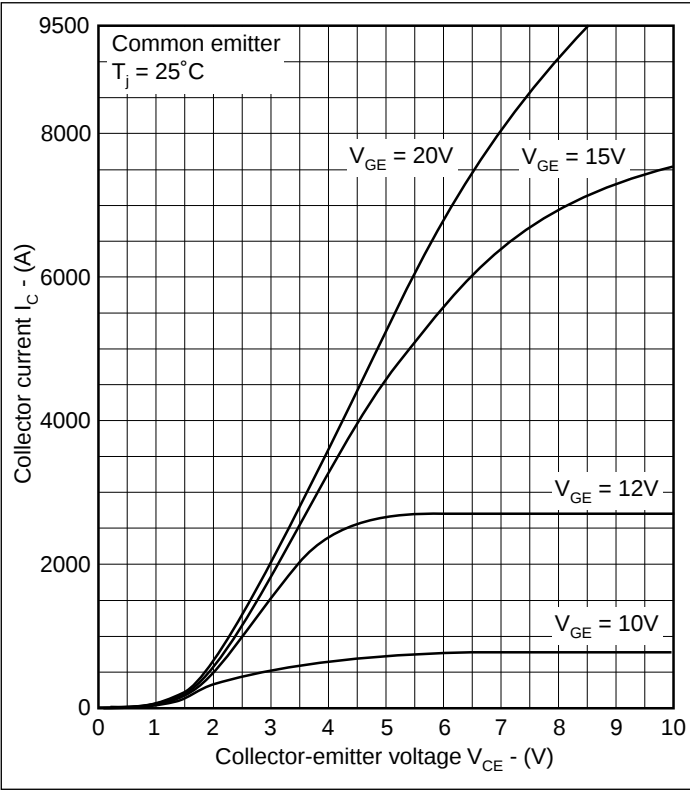


Fig.3 Typical output characteristics @ 25°C

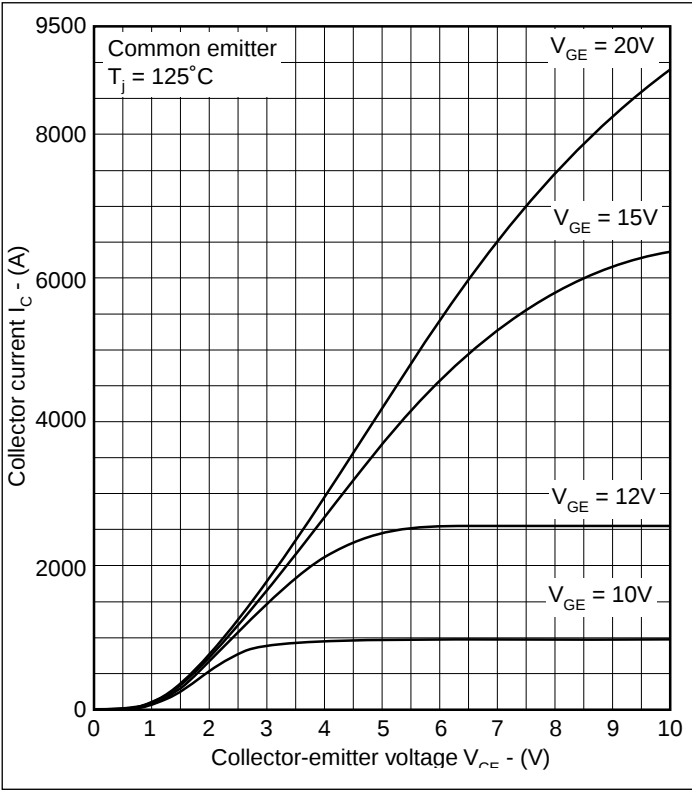


Fig.4 Typical output characteristics @ 125°C

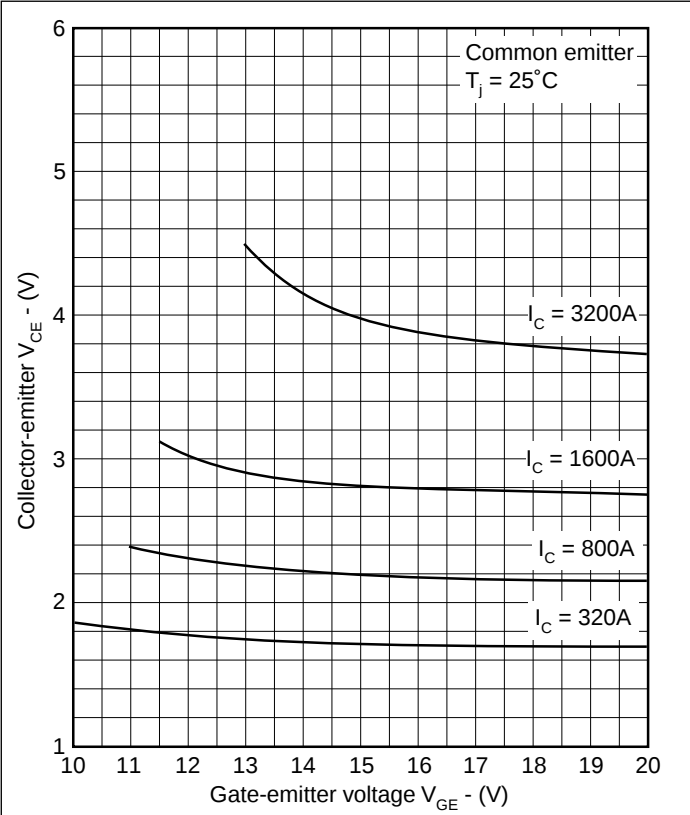


Fig.5 Typical transfer characteristics @ 25°C

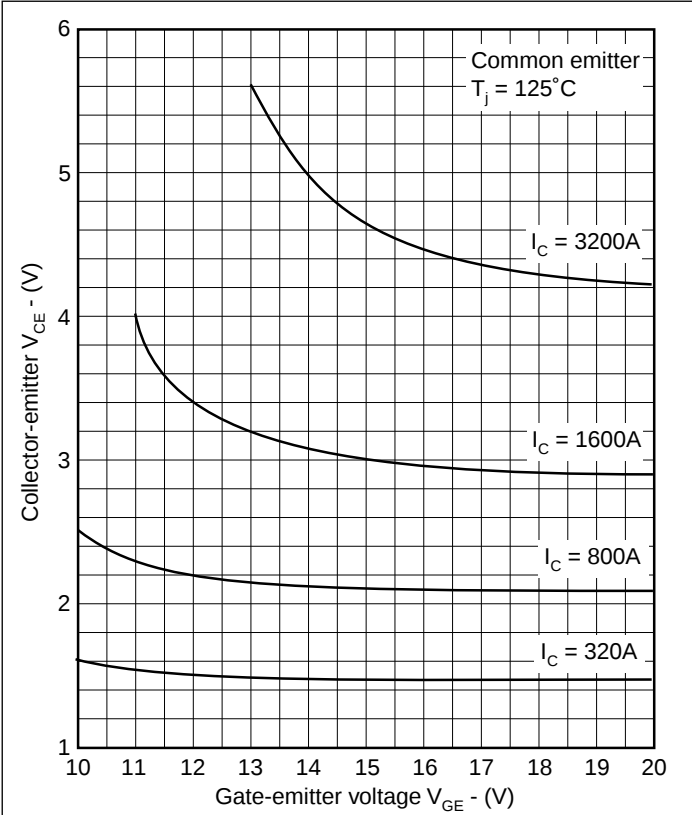


Fig.6 Typical transfer characteristics @ 125°C

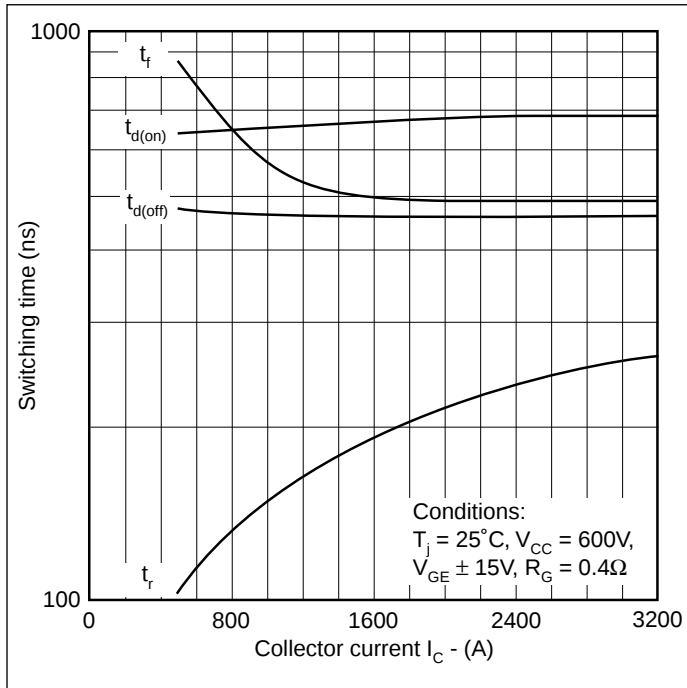
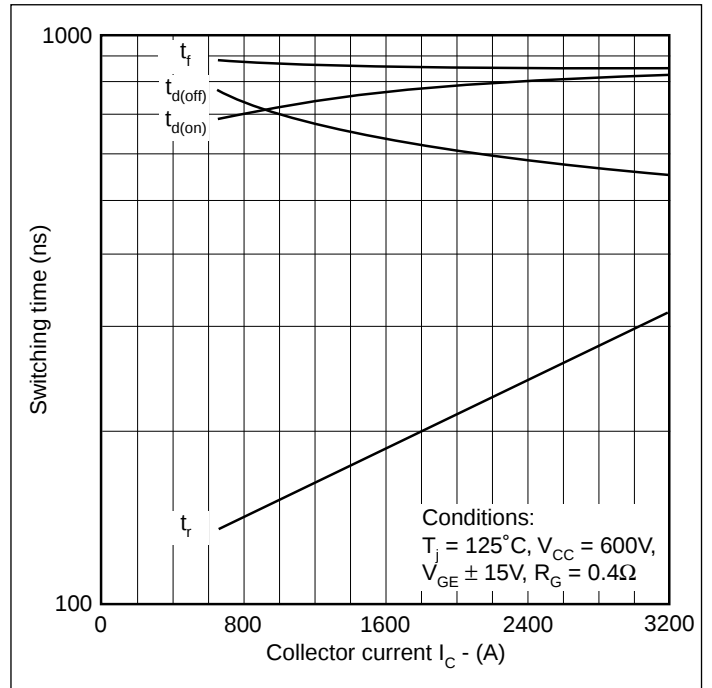
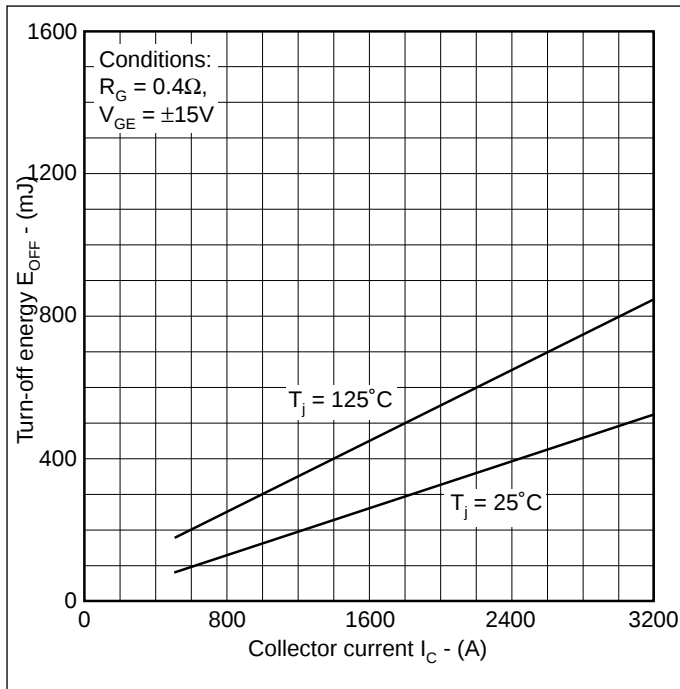
Fig.7 Typical switching time vs I_C @ 25°C Fig.8 Typical switching time vs I_C @ 125°C 

Fig.9 Typical turn-off losses

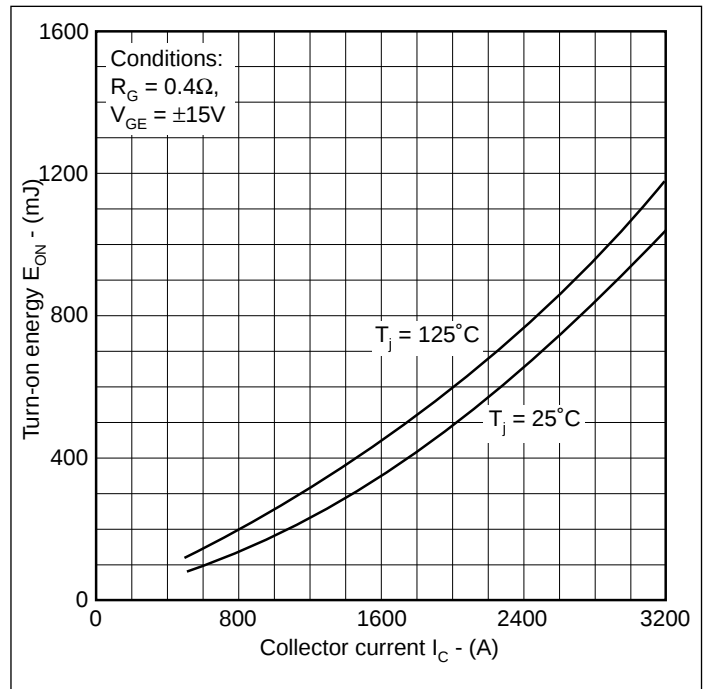


Fig.10 Typical turn-on losses

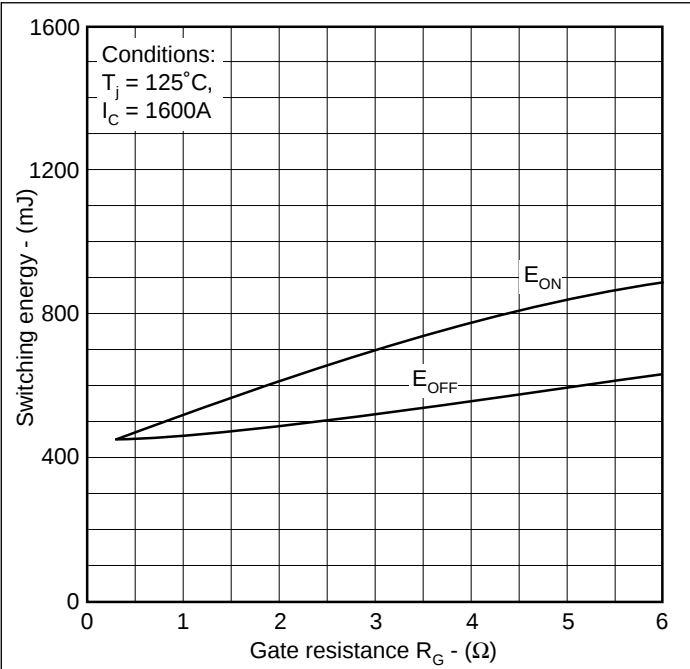


Fig.11 Typical switching energy @125°C

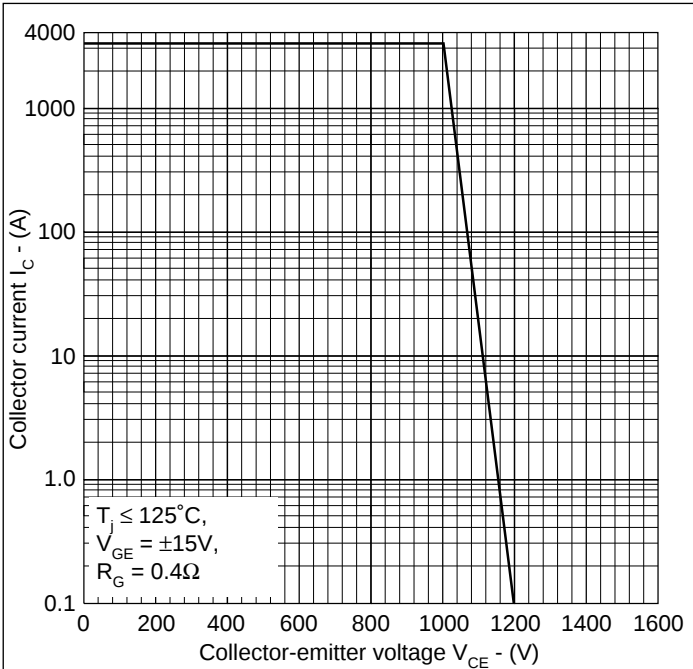


Fig.12 Reverse bias safe operating area

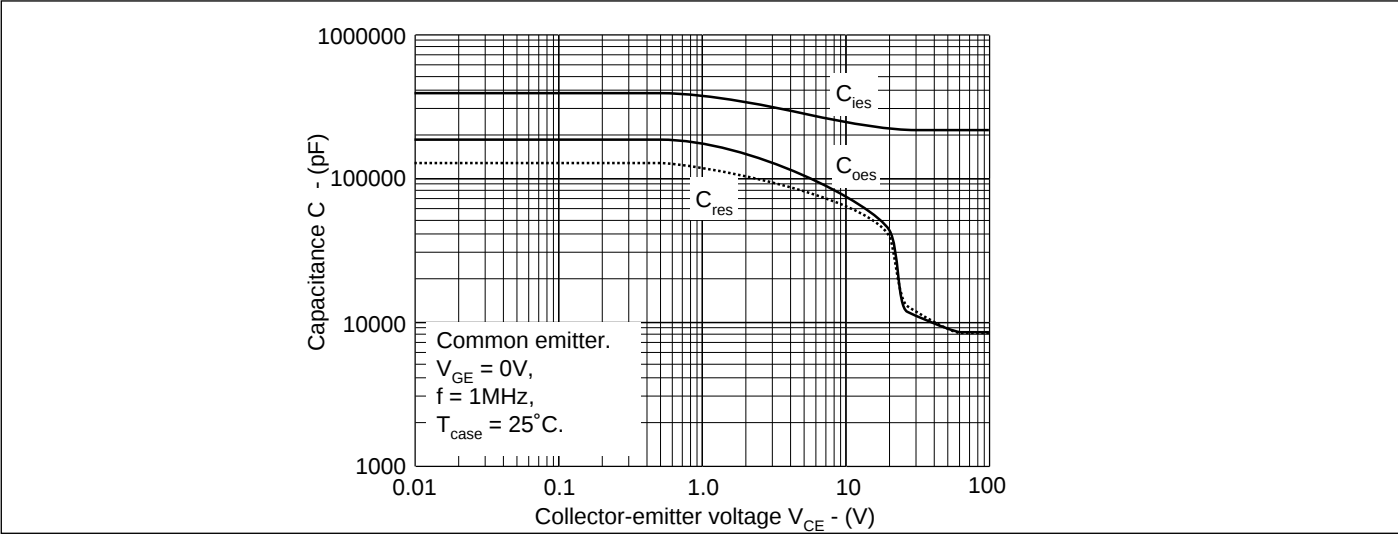


Fig.13 Typical capacitance

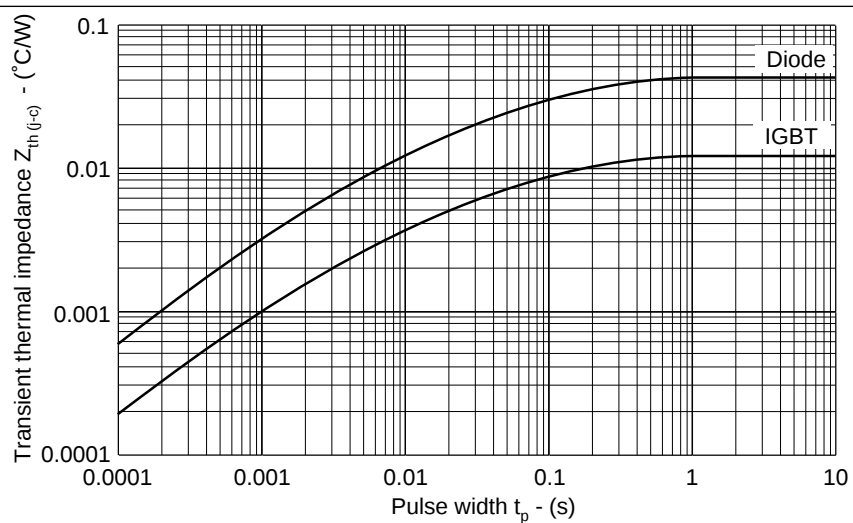


Fig.14 Transient thermal impedance

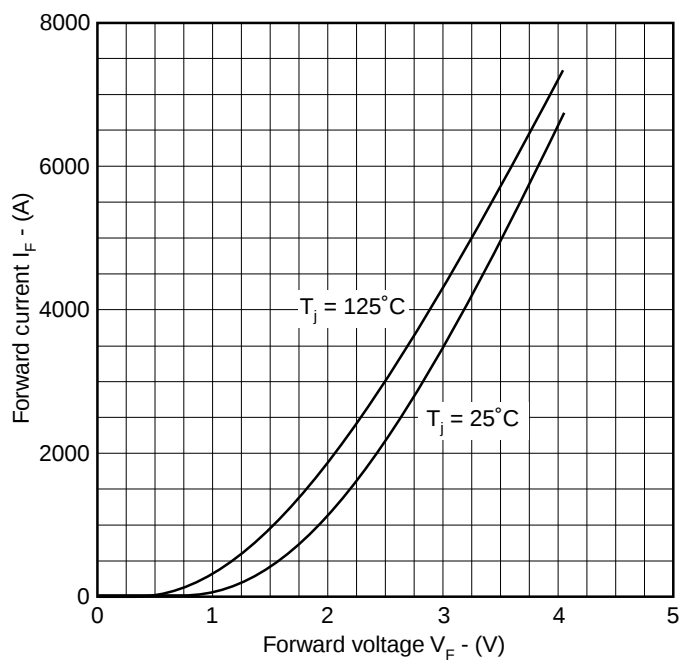
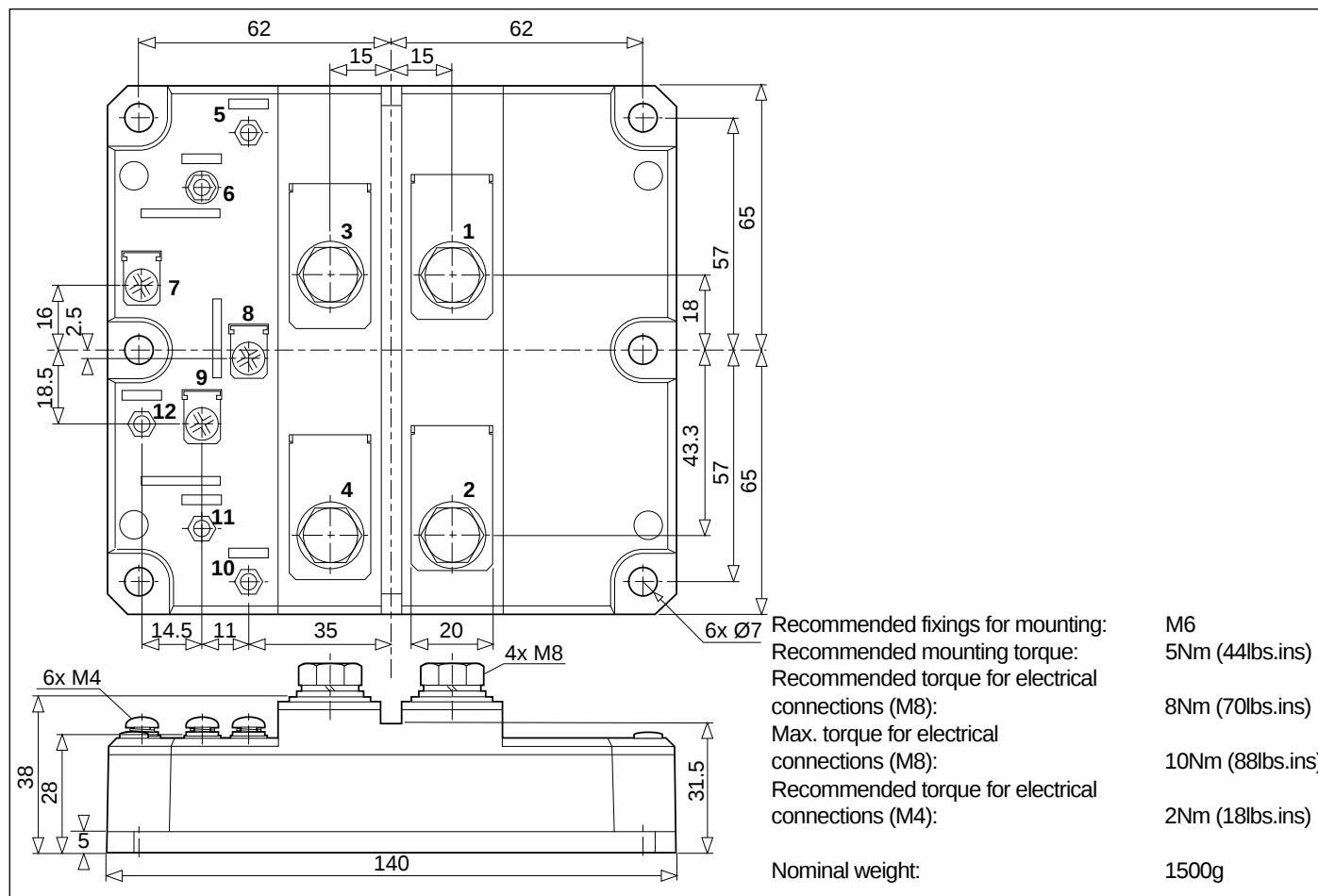


Fig.15 Typical diode forward characteristics

PACKAGE DETAILS - F

For further package information, please contact your local Customer Service Centre. All dimensions in mm, unless stated otherwise. DO NOT SCALE.



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Publication No. DS4337-4 Issue No. 4.2 July 1996 ADVANCE INFORMATION

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