Product Preview Data Sheet

Insulated Gate Bipolar Transistor with Anti-Parallel Diode

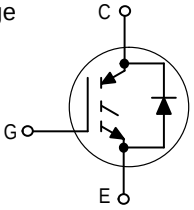
N–Channel Enhancement Mode Silicon Gate

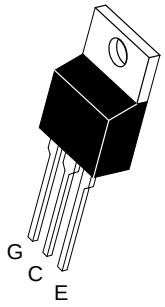
MGP11N60DE

IGBT & DIODE IN TO–220
11 A @ 90°C
15 A @ 25°C
600 VOLTS
SHORT CIRCUIT RATED
LOW ON–VOLTAGE

This Insulated Gate Bipolar Transistor (IGBT) is co–packaged with a soft recovery ultra–fast rectifier and uses an advanced termination scheme to provide an enhanced and reliable high voltage blocking capability. Its new 600V IGBT technology is specifically suited for applications requiring both a high temperature short circuit capability and a low VCE(on). It also provides fast switching characteristics and results in efficient operation at high frequencies. Co–packaged IGBTs save space, reduce assembly time and cost. This new E–series introduces an Energy–efficient and short circuit rated device.

- Industry Standard TO–220 Package
- High Speed E_{off}: 44 μJ/A typical at 125°C
- High Short Circuit Capability – 10 μs minimum at 125°C
- Low On–Voltage – 2.0V typical at 8A, 125°C
- Soft Recovery Free Wheeling Diode is included in the package
- Robust High Voltage Termination





CASE 221A–06, Style 9
TO–220AB

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CES}	600	Vdc
Collector–Gate Voltage (R_{GE} = 1.0 MΩ)	V_{CGR}	600	Vdc
Gate–Emitter Voltage — Continuous	V_{GE}	±20	Vdc
Collector Current — Continuous @ T_C = 25°C — Continuous @ T_C = 90°C — Repetitive Pulsed Current (1)	I_{C25} I_{C90} I_{CM}	15 11 30	Adc Apk
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	95 0.76	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–55 to 150	°C
Short Circuit Withstand Time (V_{CC} = 360 Vdc, V_{GE} = 15 Vdc, T_J = 125°C, R_G = 20 Ω)	t_{sc}	10	μs
Thermal Resistance — Junction to Case – IGBT — Junction to Case – Diode — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JC}$ $R_{\theta JA}$	1.32 tbd 65	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 5 seconds	T_L	260	°C
Mounting Torque, 6–32 or M3 screw	10 lbf•in (1.13 N•m)		

(1) Pulse width is limited by maximum junction temperature.

This document contains information on a new product. Specifications and information are subject to change without notice.

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

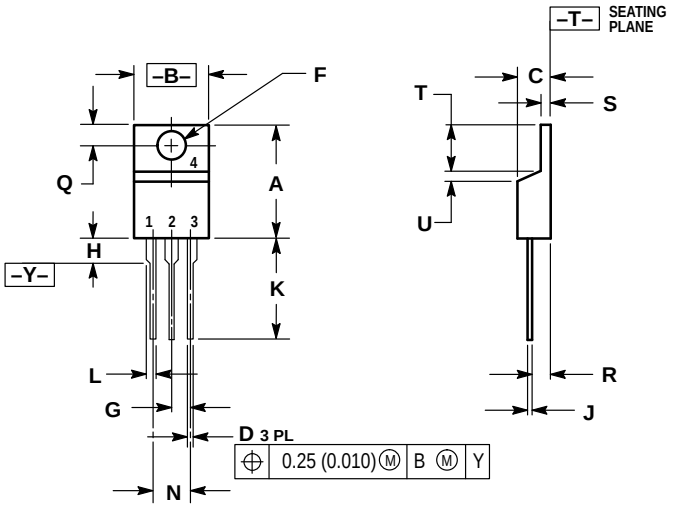
Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector–to–Emitter Breakdown Voltage (V_{GE} = 0 Vdc, I_C = 250 μAdc)		B_{VCES}	600	—	—	Vdc
Temperature Coefficient (Positive)			—	870	—	mV/°C
Zero Gate Voltage Collector Current (V_{CE} = 600 Vdc, V_{GE} = 0 Vdc)		I_{CES}	—	—	100	μAdc
(V_{CE} = 600 Vdc, V_{GE} = 0 Vdc, T_J = 125°C)			—	—	2500	
Gate–Body Leakage Current (V_{GE} = ± 20 Vdc, V_{CE} = 0 Vdc)		I_{GES}	—	—	250	nAdc
ON CHARACTERISTICS (1)						
Collector–to–Emitter On–State Voltage (V_{GE} = 15 Vdc, I_C = 4 Adc)		$V_{CE(on)}$	—	1.57	2.05	Vdc
(V_{GE} = 15 Vdc, I_C = 4 Adc, T_J = 125°C)			—	1.45	—	
(V_{GE} = 15 Vdc, I_C = 8 Adc)			—	2.01	2.75	
Gate Threshold Voltage (V_{CE} = V_{GE}, I_C = 1 mAdc)		$V_{GE(th)}$	4.0	6.0	8.0	Vdc
Threshold Temperature Coefficient (Negative)			—	10	—	mV/°C
Forward Transconductance (V_{CE} = 10 Vdc, I_C = 8 Adc)		g_{fe}	—	tbd	—	Mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{CE} = 25 Vdc, V_{GE} = 0 Vdc, f = 1.0 MHz)	C_{ies}	—	tbd	—	pF
Output Capacitance		C_{oes}	—	tbd	—	
Transfer Capacitance		C_{res}	—	tbd	—	
SWITCHING CHARACTERISTICS (1)						
Turn–On Delay Time	(V_{CC} = 360 Vdc, I_C = 8 Adc, V_{GE} = 15 Vdc, L = 300 μH, R_G = 20 Ω, T_J = 25°C) Energy losses include “tail”	$t_{d(on)}$	—	tbd	—	ns
Rise Time		t_r	—	tbd	—	
Turn–Off Delay Time		$t_{d(off)}$	—	tbd	—	
Fall Time		t_f	—	tbd	—	
Turn–Off Switching Loss		E_{off}	—	0.23	0.38	mJ
Turn–On Switching Loss		E_{on}	—	0.27	—	
Total Switching Loss		E_{ts}	—	0.50	—	
Turn–On Delay Time	(V_{CC} = 360 Vdc, I_C = 8 Adc, V_{GE} = 15 Vdc, L = 300 μH, R_G = 20 Ω, T_J = 125°C) Energy losses include “tail”	$t_{d(on)}$	—	tbd	—	ns
Rise Time		t_r	—	tbd	—	
Turn–Off Delay Time		$t_{d(off)}$	—	tbd	—	
Fall Time		t_f	—	tbd	—	
Turn–Off Switching Loss		E_{off}	—	0.35	—	mJ
Turn–On Switching Loss		E_{on}	—	0.48	—	
Total Switching Loss		E_{ts}	—	0.83	—	
Gate Charge	(V_{CC} = 360 Vdc, I_C = 8 Adc, V_{GE} = 15 Vdc)	Q_T	—	tbd	—	nC
		Q_1	—	tbd	—	
		Q_2	—	tbd	—	

ELECTRICAL CHARACTERISTICS — continued (T_J = 25°C unless otherwise noted)

Characteristic		Symbol	Min	Typ	Max	Unit
DIODE CHARACTERISTICS						
Diode Forward Voltage Drop (I_{EC} = 4 Adc) (I_{EC} = 4 Adc, T_J = 125°C) (I_{EC} = 8 Adc)		V_{FEC}	 — — —	 tbd tbd tbd	 tbd — tbd	Vdc
Reverse Recovery Time	(I_F = 8 Adc, V_R = 360 Vdc, dI_F/dt = 200 A/μs)	t_{rr}	—	tbd	—	ns
		t_a	—	tbd	—	
		t_b	—	tbd	—	
Reverse Recovery Stored Charge		Q_{RR}	—	tbd	—	μC
Reverse Recovery Time	(I_F = 8 Adc, V_R = 360 Vdc, dI_F/dt = 200 A/μs, T_J = 125°C)	t_{rr}	—	tbd	—	ns
		t_a	—	tbd	—	
		t_b	—	tbd	—	
Reverse Recovery Stored Charge		Q_{RR}	—	tbd	—	μC
INTERNAL PACKAGE INDUCTANCE						
Internal Emitter Inductance (Measured from the emitter lead 0.25″ from package to emitter bond pad)		L_E	—	7.5	—	nH

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

PACKAGE DIMENSIONS



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.560	0.625	14.23	15.87
B	0.380	0.420	9.66	10.66
C	0.140	0.190	3.56	4.82
D	0.020	0.045	0.51	1.14
F	0.139	0.155	3.53	3.93
G	0.100 BSC		2.54 BSC	
H	——	0.280	——	7.11
J	0.012	0.045	0.31	1.14
K	0.500	0.580	12.70	14.73
L	0.045	0.070	1.15	1.77
N	0.200 BSC		5.08 BSC	
Q	0.100	0.135	2.54	3.42
R	0.080	0.115	2.04	2.92
S	0.020	0.055	0.51	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27

STYLE 9:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

CASE 221A–06
TO–220AB
ISSUE Y

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