Product Preview Data Sheet

Insulated Gate Bipolar Transistor with Anti-Parallel Diode

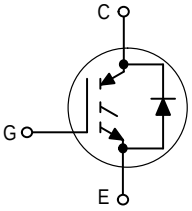
N–Channel Enhancement Mode Silicon Gate

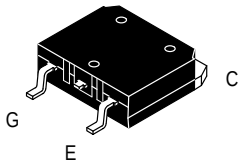
MGV12N120D

IGBT & DIODE IN D3PAK
12 A @ 90°C
20 A @ 25°C
1200 VOLTS
SHORT CIRCUIT RATED

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. Short circuit rated IGBTs are specifically suited for applications requiring a guaranteed short circuit withstand time. Fast switching characteristics result in efficient operations at high frequencies. Co–packaged IGBTs save space, reduce assembly time and cost.

- High Power Surface Mount D3PAK Package
- High Speed E_{off}: 160 μJ/A typical at 125°C
- High Short Circuit Capability – 10 μs minimum
- Soft Recovery Free Wheeling Diode is included in the package
- Robust High Voltage Termination





CASE 433–01, Style 1
TO–268AA

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

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CES}	1200	Vdc
Collector–Gate Voltage (R_{GE} = 1.0 MΩ)	V_{CGR}	1200	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}	20 12 40	Adc Apk
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	123 0.98	Watts W/°C
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–55 to 150	°C
Short Circuit Withstand Time (V_{CC} = 720 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	$R_{\theta JC}$ $R_{\theta JC}$ $R_{\theta JA}$	1.02 1.41 45	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 5 seconds	T_L	260	°C

(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)

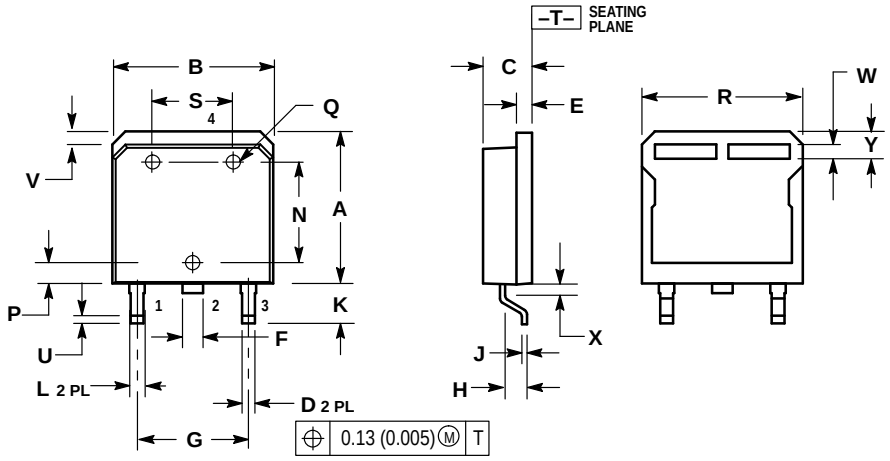
Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector–to–Emitter Breakdown Voltage (V_{GE} = 0 Vdc, I_C = 250 μAdc)		B_{VCES}	1200	—	—	Vdc
Temperature Coefficient (Positive)			—	870	—	mV/°C
Zero Gate Voltage Collector Current (V_{CE} = 1200 Vdc, V_{GE} = 0 Vdc)		I_{CES}	—	—	100	μAdc
(V_{CE} = 1200 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		$V_{CE(on)}$				Vdc
(V_{GE} = 15 Vdc, I_C = 5 Adc)			—	2.51	3.37	
(V_{GE} = 15 Vdc, I_C = 10 Adc, T_J = 125°C)			—	2.36	—	
(V_{GE} = 15 Vdc, I_C = 10 Adc)			—	3.21	4.42	
Gate Threshold Voltage		$V_{GE(th)}$				Vdc
(V_{CE} = V_{GE}, I_C = 1 mAdc)			4.0	6.0	8.0	
Threshold Temperature Coefficient (Negative)			—	10	—	mV/°C
Forward Transconductance (V_{CE} = 10 Vdc, I_C = 10 Adc)		g_{fe}	—	12	—	Mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{CE} = 25 Vdc, V_{GE} = 0 Vdc, f = 1.0 MHz)	C_{ies}	—	930	—	pF
Output Capacitance		C_{oes}	—	126	—	
Transfer Capacitance		C_{res}	—	16	—	
SWITCHING CHARACTERISTICS (1)						
Turn–On Delay Time	(V_{CC} = 720 Vdc, I_C = 10 Adc, V_{GE} = 15 Vdc, L = 300 μH R_G = 20 Ω, T_J = 25°C) Energy losses include “tail”	$t_{d(on)}$	—	80	—	ns
Rise Time		t_r	—	114	—	
Turn–Off Delay Time		$t_{d(off)}$	—	66	—	
Fall Time		t_f	—	232	—	
Turn–Off Switching Loss		E_{off}	—	0.57	1.33	mJ
Turn–On Switching Loss		E_{on}	—	1.12	1.88	
Total Switching Loss		E_{ts}	—	1.69	3.21	
Turn–On Delay Time	(V_{CC} = 720 Vdc, I_C = 10 Adc, V_{GE} = 15 Vdc, L = 300 μH R_G = 20 Ω, T_J = 125°C) Energy losses include “tail”	$t_{d(on)}$	—	74	—	ns
Rise Time		t_r	—	110	—	
Turn–Off Delay Time		$t_{d(off)}$	—	80	—	
Fall Time		t_f	—	616	—	
Turn–Off Switching Loss		E_{off}	—	1.60	—	mJ
Turn–On Switching Loss		E_{on}	—	2.30	—	
Total Switching Loss		E_{ts}	—	3.90	—	
Gate Charge	(V_{CC} = 720 Vdc, I_C = 10 Adc, V_{GE} = 15 Vdc)	Q_T	—	31	—	nC
		Q_1	—	13	—	
		Q_2	—	14	—	

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

Characteristic		Symbol	Min	Typ	Max	Unit
DIODE CHARACTERISTICS						
Diode Forward Voltage Drop (I_{EC} = 5 Adc) (I_{EC} = 5 Adc, T_J = 125°C) (I_{EC} = 10 Adc)		V_{FEC}	 — — —	 2.75 2.50 3.50	 3.22 — 4.18	Vdc
Reverse Recovery Time	(I_F = 10 Adc, V_R = 720 Vdc, dI_F/dt = 200 A/μs)	t_{rr}	—	54	—	ns
		t_a	—	30	—	
		t_b	—	24	—	
Reverse Recovery Stored Charge		Q_{RR}	—	61	—	μC
Reverse Recovery Time	(I_F = 10 Adc, V_R = 720 Vdc, dI_F/dt = 200 A/μs, T_J = 125°C)	t_{rr}	—	150	—	ns
		t_a	—	102	—	
		t_b	—	48	—	
Reverse Recovery Stored Charge		Q_{RR}	—	653	—	μC

(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	0.588	0.592	14.94	15.04
B	0.623	0.627	15.82	15.93
C	0.196	0.200	4.98	5.08
D	0.048	0.052	1.22	1.32
E	0.058	0.062	1.47	1.57
F	0.078	0.082	1.98	2.08
G	0.430 BSC		1.092 BSC	
H	0.105	0.110	2.67	2.79
J	0.018	0.022	0.46	0.56
K	0.150	0.160	3.81	4.06
L	0.058	0.062	1.47	1.57
N	0.353	0.357	8.97	9.07
P	0.078	0.082	1.98	2.08
Q	0.053	0.057	1.35	1.45
R	0.623	0.627	15.82	15.93
S	0.313	0.317	7.95	8.05
U	0.028	0.032	0.71	0.81
V	0.050	—	1.27	—
W	0.054	0.058	1.37	1.47
X	0.050	0.060	1.27	1.52
Y	0.104	0.108	2.64	2.74

STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

CASE 433–01
ISSUE B

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