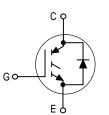
# Product Preview Data Sheet

## **Insulated Gate Bipolar Transistor with Anti-Parallel Diode** N-Channel Enhancement Mode Silicon Gate

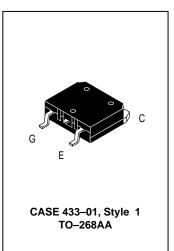
This Insulated Gate Bipolar Transistor (IGBT) is co-packaged with a soft recovery ultra-fast rectifier and uses an advanced termination scheme to provide an enhanced and reliable high voltage blocking capability. Short circuit rated IGBTs are specifically suited for applications requiring a guaranteed 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 Eoff: 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





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



#### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	VCES	1200	Vdc
Collector–Gate Voltage ( $R_{GE}$ = 1.0 M $\Omega$ )	VCGR	1200	Vdc
Gate-Emitter Voltage — Continuous	V <sub>GE</sub>	±20	Vdc
Collector Current— Continuous @ $T_C = 25^{\circ}C$ — Continuous @ $T_C = 90^{\circ}C$ — Repetitive Pulsed Current (1)	IC25 IC90 ICM	20 12 40	Adc Apk
Total Power Dissipation @ T <sub>C</sub> = 25°C Derate above 25°C	PD	123 0.98	Watts W/°C
Operating and Storage Junction Temperature Range	TJ, Tstg	-55 to 150	°C
Short Circuit Withstand Time (V <sub>CC</sub> = 720 Vdc, V <sub>GE</sub> = 15 Vdc, T <sub>J</sub> = 125°C, R <sub>G</sub> = 20 $\Omega$ )	t <sub>sc</sub>	10	μs
Thermal Resistance — Junction to Case – IGBT — Junction to Case – Diode — Junction to Ambient	R <sub>θ</sub> JC R <sub>θ</sub> JC R <sub>θ</sub> JA	1.02 1.41 45	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	т	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.



### MGV12N120D

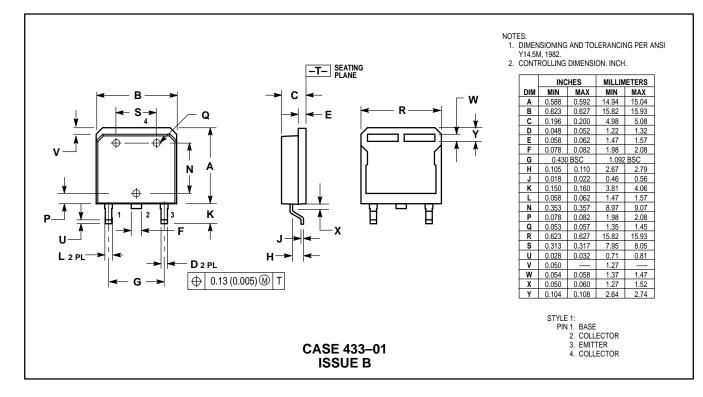
### **ELECTRICAL CHARACTERISTICS** (T<sub>J</sub> = $25^{\circ}$ C unless otherwise noted)

Cha	aracteristic	Symbol	Min	Тур	Max	Unit
OFF CHARACTERISTICS		•				
Collector–to–Emitter Breakdown V (V <sub>GE</sub> = 0 Vdc, I <sub>C</sub> = 250 µAdc) Temperature Coefficient (Positiv	C .	BVCES	1200 —	 870		Vdc mV/°C
Zero Gate Voltage Collector Current (V <sub>CE</sub> = 1200 Vdc, V <sub>GE</sub> = 0 Vdc) (V <sub>CE</sub> = 1200 Vdc, V <sub>GE</sub> = 0 Vdc, T <sub>J</sub> = 125°C)		ICES			100 2500	μAdc
Gate–Body Leakage Current (V <sub>GE</sub> = ± 20 Vdc, V <sub>CE</sub> = 0 Vdc)		IGES	—	—	250	nAdc
ON CHARACTERISTICS (1)		•	•			
$\label{eq:constant} \begin{array}{ c c } \hline Collector-to-Emitter On-State Vol \\ (V_{GE} = 15 Vdc, I_{C} = 5 Adc) \\ (V_{GE} = 15 Vdc, I_{C} = 10 Adc, T_{J} \\ (V_{GE} = 15 Vdc, I_{C} = 10 Adc) \end{array}$	Ū	VCE(on)		2.51 2.36 3.21	3.37  4.42	Vdc
Gate Threshold Voltage ( $V_{CE} = V_{GE}$ , $I_C = 1$ mAdc) Threshold Temperature Coefficie	ent (Negative)	VGE(th)	4.0	6.0 10	8.0 —	Vdc mV/°C
Forward Transconductance (VCE =	= 10 Vdc, I <sub>C</sub> = 10 Adc)	9fe	_	12	—	Mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance		C <sub>ies</sub>	—	930	-	pF
Output Capacitance	(V <sub>CE</sub> = 25 Vdc, V <sub>GE</sub> = 0 Vdc, f = 1.0 MHz)	C <sub>oes</sub>	—	126	—	
Transfer Capacitance	]	C <sub>res</sub>	—	16	—	
SWITCHING CHARACTERISTICS (	1)	•	•	•		
Turn–On Delay Time	(1/2) = -720 $(1/2) = -10$ $(1/2)$	<sup>t</sup> d(on)	-	80	-	ns
Rise Time	(V <sub>CC</sub> = 720 Vdc, I <sub>C</sub> = 10 Adc, V <sub>GE</sub> = 15 Vdc, L = 300 μH	tr	-	114	-	
Turn–Off Delay Time	$R_G = 20 \Omega, T_J = 25^{\circ}C)$ Energy losses include "tail"	<sup>t</sup> d(off)	-	66	-	
Fall Time		tf	—	232	—	
Turn–Off Switching Loss		E <sub>off</sub>	_	0.57	1.33	mJ
Turn–On Switching Loss		E <sub>on</sub>	—	1.12	1.88	
Total Switching Loss		E <sub>ts</sub>	_	1.69	3.21	
Turn–On Delay Time		<sup>t</sup> d(on)	—	74	—	ns
Rise Time	(V <sub>CC</sub> = 720 Vdc, I <sub>C</sub> = 10 Adc, V <sub>CF</sub> = 15 Vdc, L = 300 μH	tr	—	110	—	1
Turn–Off Delay Time	$R_G = 20 \Omega, T_J = 125^{\circ}C)$ Energy losses include "tail"	td(off)	_	80	—	1
Fall Time		t <sub>f</sub>	- 1	616	-	1
Turn–Off Switching Loss		E <sub>off</sub>	_	1.60	_	mJ
Turn–On Switching Loss		E <sub>on</sub>	_	2.30	_	1
Total Switching Loss		E <sub>ts</sub>	_	3.90	_	1
Gate Charge		QT	_	31	_	nC
	(V <sub>CC</sub> = 720 Vdc, I <sub>C</sub> = 10 Adc, V <sub>GE</sub> = 15 Vdc)	Q <sub>1</sub>	_	13	_	1
		Q2	_	14	_	1

## **ELECTRICAL CHARACTERISTICS** — continued (T<sub>J</sub> = $25^{\circ}$ C unless otherwise noted)

Char	acteristic	Symbol	Min	Тур	Max	Unit
DIODE CHARACTERISTICS						
Diode Forward Voltage Drop $(I_{EC} = 5 \text{ Adc})$ $(I_{EC} = 5 \text{ Adc}, T_J = 125^{\circ}\text{C})$ $(I_{EC} = 10 \text{ Adc})$		VFEC	  	2.75 2.50 3.50	3.22  4.18	Vdc
Reverse Recovery Time	(I <sub>F</sub> = 10 Adc, V <sub>R</sub> = 720 Vdc, dI <sub>F</sub> /dt = 200 A/μs)	t <sub>rr</sub>	—	54	—	ns
		ta	—	30	—	
		tb	—	24	—	
Reverse Recovery Stored Charge		Q <sub>RR</sub>	—	61	—	μC
Reverse Recovery Time	(I <sub>F</sub> = 10 Adc, V <sub>R</sub> = 720 Vdc, dI <sub>F</sub> /dt = 200 A/μs, T <sub>J</sub> = 125°C)	t <sub>rr</sub>	—	150	—	ns
		ta	—	102	—	
		tb	-	48	—	
Reverse Recovery Stored Charge		Q <sub>RR</sub>	—	653	—	μC

(1) Pulse Test: Pulse Width  $\leq$  300  $\mu s,$  Duty Cycle  $\leq$  2%.



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