

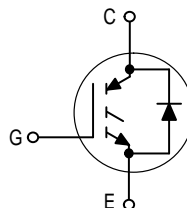
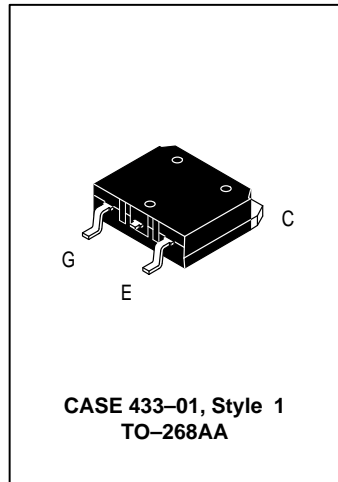
Product Preview Data Sheet
**Insulated Gate Bipolar Transistor
with Anti-Parallel Diode**
N-Channel Enhancement Mode Silicon Gate

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 μ J/A typical at 125°C
- High Short Circuit Capability – 10 μ s minimum
- Soft Recovery Free Wheeling Diode is included in the package
- Robust High Voltage Termination



MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	1200	Vdc
Collector-Gate Voltage ($R_{GE} = 1.0 \text{ M}\Omega$)	V_{CGR}	1200	Vdc
Gate-Emitter Voltage — Continuous	V_{GE}	± 20	Vdc
Collector Current — Continuous @ $T_C = 25^\circ\text{C}$	I_{C25}	20	Adc
— Continuous @ $T_C = 90^\circ\text{C}$	I_{C90}	12	
— Repetitive Pulsed Current (1)	I_{CM}	40	Apk
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ 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 ($V_{CC} = 720 \text{ Vdc}, V_{GE} = 15 \text{ Vdc}, T_J = 125^\circ\text{C}, R_G = 20 \Omega$)	t_{sc}	10	μ s
Thermal Resistance — Junction to Case – IGBT	$R_{\theta JC}$	1.02	°C/W
— Junction to Case – Diode	$R_{\theta JC}$	1.41	
— Junction to Ambient	$R_{\theta JA}$	45	
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.

MGV12N120D

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) Temperature Coefficient (Positive)	B _V CES	1200 —	— 870	— —	Vdc mV/°C
Zero Gate Voltage Collector Current (V _{CE} = 1200 Vdc, V _{GE} = 0 Vdc) (V _{CE} = 1200 Vdc, V _{GE} = 0 Vdc, T _J = 125°C)	I _C ES	— —	— —	100 2500	μAdc
Gate-Body Leakage Current (V _{GE} = ± 20 Vdc, V _{CE} = 0 Vdc)	I _G ES	—	—	250	nAdc

ON CHARACTERISTICS (1)

Collector-to-Emitter On-State Voltage (V _{GE} = 15 Vdc, I _C = 5 Adc) (V _{GE} = 15 Vdc, I _C = 10 Adc, T _J = 125°C) (V _{GE} = 15 Vdc, I _C = 10 Adc)	V _{CE(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 Coefficient (Negative)	V _{GE(th)}	4.0 —	6.0 10	8.0 —	Vdc 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)

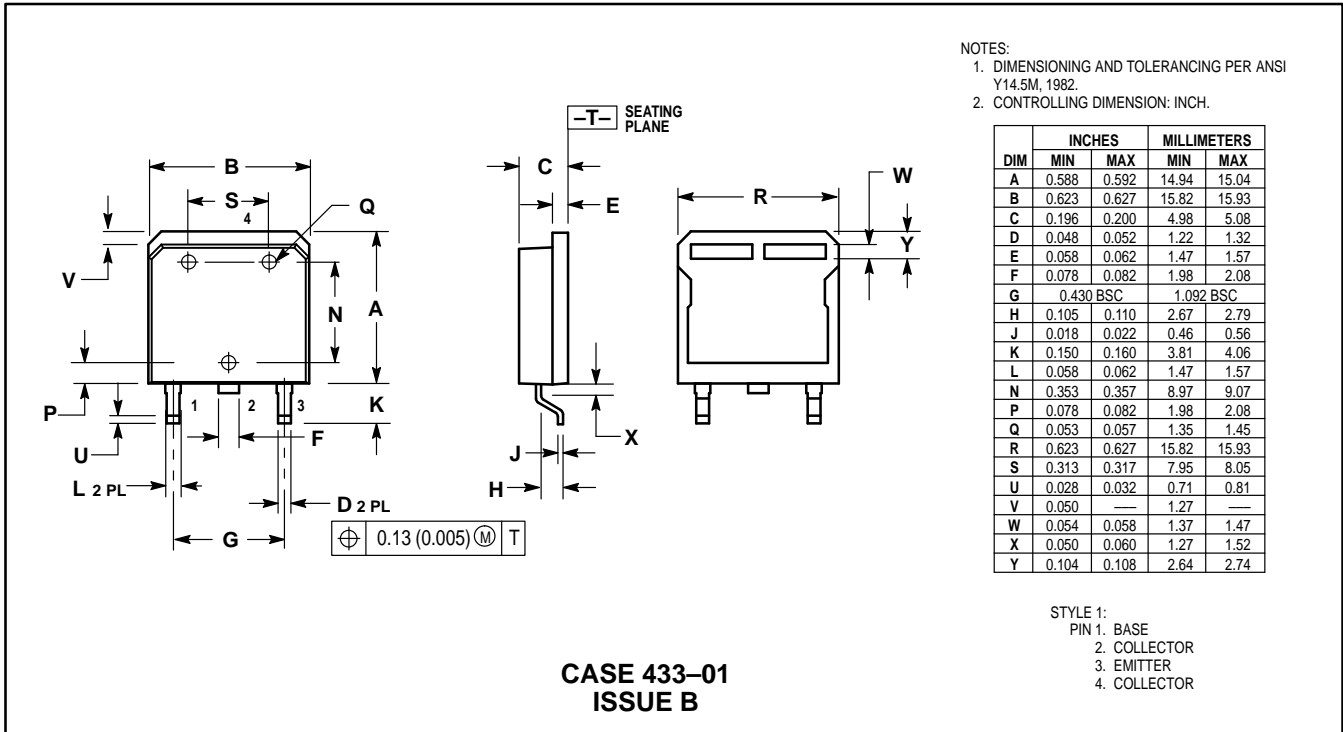
Turn-On Delay Time	(V _{CC} = 720 Vdc, I _C = 10 Adc, V _{GE} = 15 Vdc, L = 300 μH R _G = 20 Ω, T _J = 25°C) Energy losses include "tail"	t _{d(on)}	—	80	—	ns
Rise Time		t _r	—	114	—	
Turn-Off Delay Time		t _{d(off)}	—	66	—	
Fall Time		t _f	—	232	—	
Turn-Off Switching Loss		E _{off}	—	0.57	1.33	mJ
Turn-On 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 ($T_J = 25^\circ\text{C}$ unless otherwise noted)

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

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

PACKAGE DIMENSIONS



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