

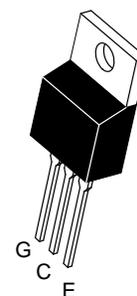
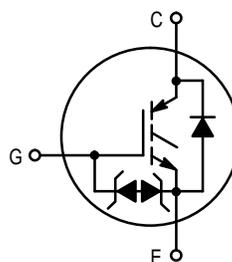
Preliminary Data Sheet
Insulated Gate Bipolar Transistor
N-Channel Enhancement-Mode Silicon Gate

MGP2N60D

IGBT
1.5 AMPS
600 VOLTS

This Insulated Gate Bipolar Transistor (IGBT) contains a built-in free wheeling diode and a gate protection zener. Fast switching characteristics result in efficient operation at higher frequencies.

- Built In Free Wheeling Diode
- Built In Gate Protection Zener Diode
- Industry Standard Package TO220
- High Speed: $E_{off} = 35 \mu\text{J/A}$ Typical at 125°C
- Robust High Voltage Termination



CASE 221A-09
STYLE 9
TO-220AB

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

Parameters	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CES}	600	Vdc
Collector-Gate Voltage ($R_{GE} = 1.0 \text{ M}\Omega$)	V_{CGR}	600	Vdc
Gate-Emitter Voltage — Continuous	V_{GE}	± 15	Vdc
Collector Current — Continuous @ $T_C = 25^\circ\text{C}$ — Continuous @ $T_C = 90^\circ\text{C}$ — Repetitive Pulsed Current (1)	I_{C25} I_{C90} I_{CM}	1.5 0.9 6.0	Adc
Total Device Dissipation @ $T_C = 25^\circ\text{C}$	P_D	75	Watts
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Thermal Resistance — Junction to Case – IGBT — Junction to Case – Diode — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JC}$ $R_{\theta JA}$	1.67 TBD 62.5	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T_L	260	$^\circ\text{C/W}$

(1) Pulse width limited by maximum junction temperature repetitive rating.

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

MGP2N60D

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 = 750 μAdc) Temperature Coefficient (Positive)	V _{(BR)CES}	600 —	680 670	— —	Vdc mV/°C
Zero Gate Voltage Collector Current (V _{CE} = 600 Vdc, V _{GE} = 0 Vdc) (V _{CE} = 600 Vdc, V _{GE} = 0 Vdc, T _J = 125°C)	I _{CES}	— —	0.3 15	15 150	μAdc
Gate-Body Leakage Current (V _{GE} = ±15 Vdc, V _{CE} = 0 Vdc)	I _{GES}	—	30	300	μAdc

ON CHARACTERISTICS

Collector-to-Emitter On-State Voltage (V _{GE} = 15 Vdc, I _C = 0.9 Adc, T _C = 25°C) (V _{GE} = 15 Vdc, I _C = 0.9 Adc, T _C = 125°C)	V _{CE(on)}	— —	1.6 1.5	2.0 —	Vdc
Gate Threshold Voltage (V _{CE} = V _{GE} , I _C = 750 μAdc) Threshold Temperature Coefficient (Negative)	V _{GE(th)}	4.0 —	— 5.0	6.0 —	Vdc mV/°C
Forward Transconductance (V _{CE} = 10 Vdc, I _C = 1.5 Adc)	g _{fe}	0.3	0.42	—	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	(V _{CE} = 20 Vdc, V _{GE} = 0 Vdc, f = 1.0 MHz)	C _{ies}	—	300	TBD	pF
Output Capacitance		C _{oes}	—	75	TBD	
Transfer Capacitance		C _{res}	—	30	TBD	

DIODE CHARACTERISTICS

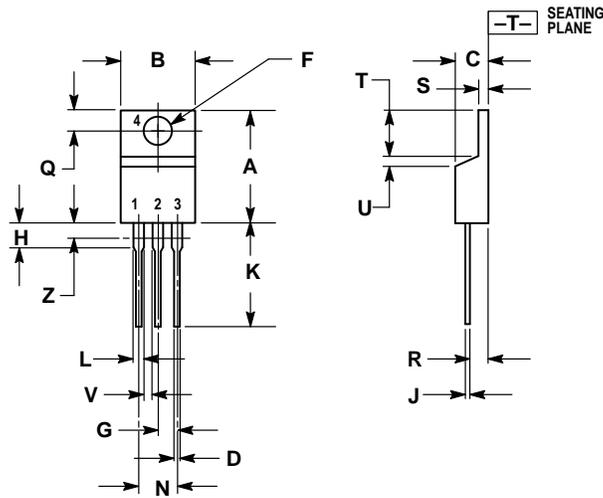
Diode Forward Voltage Drop (I _{EC} = 0.9 Adc) (I _{EC} = 0.9 Adc, T _J = 125°C) (I _{EC} = 0.3 Adc) (I _{EC} = 0.3 Adc, T _J = 125°C)	V _{FEC}	— — — —	5.3 5.7 2.7 2.6	6.0 — TBD —	Vdc	
Reverse Recovery Time	(I _F = 0.3 Adc, V _R = 300 Vdc, dI _F /dt = 10 A/μs)	t _{rr}	—	TBD	—	ns
	(I _F = 0.9 Adc, V _R = 300 Vdc, dI _F /dt = 10 A/μs)		—	TBD		
Reverse Recovery Stored Charge	(I _F = 0.3 Adc, V _R = 300 Vdc, dI _F /dt = 10 A/μs)	Q _{RR}	—	TBD	—	μC
Forward Recovery Time, (I _F = 0.3 Adc, dI _F /dt = 10 A/μs) (I _F = 0.9 Adc, dI _F /dt = 10 A/μs) (I _F = 1.5 Adc, dI _F /dt = 10 A/μs)	t _{fr}	— — —	TBD TBD TBD	— — —	ns	

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

Characteristic	Symbol	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS (1)					
Turn-On Delay Time	$t_{d(on)}$	—	TBD	—	ns
Rise Time	t_r	—	TBD	—	
Turn-Off Delay Time	$t_{d(off)}$	—	TBD	—	
Fall Time	t_f	—	130	—	
Turn-Off Switching Loss	E_{off}	—	TBD	—	μJ
Turn-On Switching Loss	E_{on}	—	TBD	—	
Total Switching Loss	E_{ts}	—	TBD	—	
Turn-On Delay Time	$t_{d(on)}$	—	TBD	—	ns
Rise Time	t_r	—	TBD	—	
Turn-Off Delay Time	$t_{d(off)}$	—	TBD	—	
Fall Time	t_f	—	270	—	
Turn-Off Switching Loss	E_{off}	—	TBD	—	μJ
Turn-On Switching Loss	E_{on}	—	TBD	—	
Total Switching Loss	E_{ts}	—	TBD	—	
Gate Charge	Q_T	—	TBD	—	nC

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

PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.
 3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	—	1.15	—
Z	—	0.080	—	2.04

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

CASE 221A-09
 (TO-220AB)
 ISSUE Z

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