

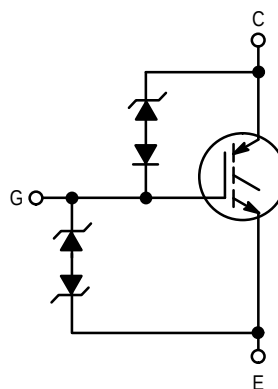
Product Preview

SMARTDISCRETES™

Internally Clamped, N-Channel IGBT

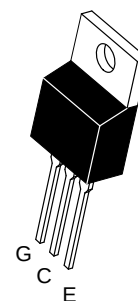
This Logic Level Insulated Gate Bipolar Transistor (IGBT) features Gate–Emitter ESD protection, Gate–Collector overvoltage protection from SMARTDISCRETES™ monolithic circuitry for usage as an **Ignition Coil Driver**.

- Temperature Compensated Gate–Collector Clamp Limits Stress Applied to Load
- Integrated ESD Diode Protection
- Low Threshold Voltage to Interface Power Loads to Logic or Microprocessors
- Low Saturation Voltage
- High Pulsed Current Capability



MGP20N14CL

**20 AMPERES
VOLTAGE CLAMPED
N-CHANNEL IGBT
 $V_{CE(on)} = 1.9$ VOLTS
135 VOLTS (CLAMPED)**



**CASE 221A-09
STYLE 9
TO-220AB**

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

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CES}	CLAMPED	Vdc
Collector–Gate Voltage	V_{CGR}	CLAMPED	Vdc
Gate–Emitter Voltage	V_{GE}	CLAMPED	Vdc
Collector Current — Continuous	I_C	20	Adc
— Single Pulsed ($t_p = \pm 10 \mu\text{s}$)	I_{CM}	60	Apk
Total Power Dissipation (TO-220) Derate Above 25°C	P_D	150 1.0	Watts $\text{W}/^\circ\text{C}$
Operating and Storage Temperature Range	T_J, T_{stg}	-55 to 175	$^\circ\text{C}$
Single Pulse Collector–Emitter Avalanche Energy @ Starting $T_J = 25^\circ\text{C}$ ($V_{CC} = 80 \text{ V}$, $V_{GE} = 5 \text{ V}$, Peak $I_L = 10 \text{ A}$, $L = 10 \text{ mH}$)	E_{AS}	500	mJ

THERMAL CHARACTERISTICS

Thermal Resistance — Junction to Case – (TO-220) — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	1.0 62.5	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T_L	260	$^\circ\text{C}$
Mounting Torque, 6–32 or M3 screw	10 lbf•in (1.13 N•m)		

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



MGP20N14CL**ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Clamp Voltage ($I_{\text{Clamp}} = 10\text{ mA}$, $T_J = -40\text{ to }150^\circ\text{C}$)	$V_{(\text{BR})\text{CES}}$	135			Vdc
Zero Gate Voltage Collector Current ($V_{\text{CE}} = 100\text{ V}$, $V_{\text{GE}} = 0\text{ V}$) ($V_{\text{CE}} = 100\text{ V}$, $V_{\text{GE}} = 0\text{ V}$, $T_J = 150^\circ\text{C}$)	I_{CES}	— —	— —	10 100	μA
Gate–Emitter Clamp Voltage ($I_G = 1\text{ mA}$)	$V_{(\text{BR})\text{GES}}$	10			Vdc
Gate–Emitter Leakage Current ($V_{\text{GE}} = \pm 5\text{ V}$, $V_{\text{CE}} = 0\text{ V}$)	I_{GES}	—	—	1.0	μA

ON CHARACTERISTICS (1)

Gate Threshold Voltage ($V_{\text{CE}} = V_{\text{GE}}$, $I_C = 1\text{ mA}$) Threshold Temperature Coefficient (Negative)	$V_{\text{GE}(\text{th})}$	1.0	1.5 4.4	2.0	V mV/ $^\circ\text{C}$
Collector–Emitter On–Voltage ($V_{\text{GE}} = 5\text{ V}$, $I_C = 10\text{ A}$) ($V_{\text{GE}} = 5\text{ V}$, $I_C = 10\text{ A}$, $T_J = 175^\circ\text{C}$)	$V_{\text{CE}(\text{on})}$	— —		1.9 1.8	V
Forward Transconductance ($V_{\text{CE}} > 15\text{ V}$, $I_C = 10\text{ A}$)	g_{fe}	8.0	15	—	Mhos

DYNAMIC CHARACTERISTICS

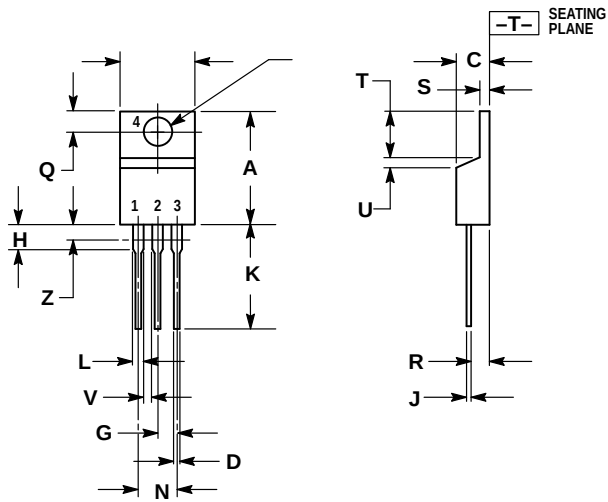
Input Capacitance	$(V_{\text{CE}} = 25\text{ Vdc}$, $V_{\text{GE}} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$)	C_{ies}	—	430	600	pF
Output Capacitance		C_{oes}	—	182	250	
Transfer Capacitance		C_{res}	—	48	100	

SWITCHING CHARACTERISTICS (1)

Turn–On Delay Time	$(V_{\text{CC}} = 68\text{ V}$, $I_C = 20\text{ A}$, $V_{\text{GE}} = 5\text{ V}$, $R_G = 9.1\ \Omega$)	$t_{\text{d}(\text{on})}$	—	TBD	TBD	ns
Rise Time		t_r	—	TBD	TBD	
Turn–Off Delay Time		$t_{\text{d}(\text{off})}$	—	TBD	TBD	
Fall Time		t_f	—	TBD	TBD	
Total Gate Charge	$(V_{\text{CC}} = 108\text{ V}$, $I_C = 20\text{ A}$, $V_{\text{GE}} = 5\text{ V}$)	Q_T	—	14	20	nC
Gate–Emitter Charge		Q_{ge}	—	3.0	—	
Gate–Collector Charge		Q_{gc}	—	6.0	—	

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

PACKAGE DIMENSIONS



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

- 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

CASE 221A-09
 ISSUE Z

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