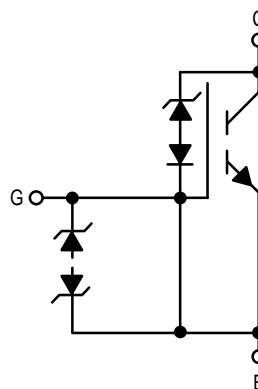


*Product Preview*

**SMARTDISCRETES™**  
**Internally Clamped, N-Channel**  
**IGBT**

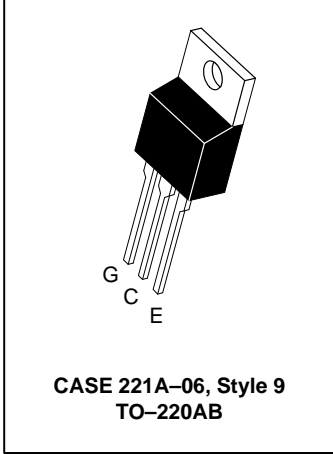
This Logic Level Insulated Gate Bipolar Transistor (IGBT) features Gate–Emitter ESD protection, Gate–Collector overvoltage protection from SMARTDISCRETES™ monolithic circuitry for usage as an **Ignition Coil Driver**.

- Temperature Compensated Gate–Drain 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<sub>ce(on)</sub> = 1.9 VOLTS**  
**135 VOLTS (CLAMPED)**



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

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V <sub>CES</sub>	CLAMPED	V <sub>dc</sub>
Collector–Gate Voltage	V <sub>CGR</sub>	CLAMPED	V <sub>dc</sub>
Gate–Emitter Voltage	V <sub>GE</sub>	CLAMPED	V <sub>dc</sub>
Collector Current — Continuous @ T <sub>C</sub> = 25°C — Single Pulsed (t <sub>p</sub> = ± 10 μs)	I <sub>C</sub> I <sub>CM</sub>	20 60	Adc Apk
Total Power Dissipation @ T <sub>C</sub> = 25°C (TO-220) Derate Above 25°C	P <sub>D</sub>	150 1.0	Watts W/°C
Operating and Storage Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	–55 to 175	°C
Single Pulse Collector–Emitter Avalanche Energy @ Starting T <sub>J</sub> = 25°C (V <sub>CC</sub> = 80 V, V <sub>GE</sub> = 5 V, Peak I <sub>L</sub> = 10 A, L = 10 mH)	E <sub>AS</sub>	500	mJ

**THERMAL CHARACTERISTICS**

Thermal Resistance — Junction to Case – (TO-220) — Junction to Ambient	R <sub>θJC</sub> R <sub>θJA</sub>	1.0 62.5	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T <sub>L</sub>	275	°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<sub>C</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Clamp Voltage (I <sub>Clamp</sub> = 10 mA, T <sub>J</sub> = -40 to 150°C)	B <sub>V</sub> CE <sub>S</sub>	135			V <sub>dc</sub>
Zero Gate Voltage Collector Current (V <sub>CE</sub> = 100 V, V <sub>GE</sub> = 0 V) (V <sub>CE</sub> = 100 V, V <sub>GE</sub> = 0 V, T <sub>J</sub> = 150°C)	I <sub>CES</sub>	—	—	10 100	μA
Gate-Emitter Clamp Voltage (I <sub>G</sub> = 1 mA)	B <sub>V</sub> GES	10			V <sub>dc</sub>
Gate-Emitter Leakage Current (V <sub>GE</sub> = ±5 V, V <sub>CE</sub> = 0 V)	I <sub>GES</sub>	—	—	1.0	μA

### ON CHARACTERISTICS (1)

Gate Threshold Voltage (V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 1 mA) Threshold Temperature Coefficient (Negative)	V <sub>CE(th)</sub>	1.0	1.5 4.4	2.0	V mV/°C
Collector-Emitter On-Voltage (V <sub>GE</sub> = 5 V, I <sub>C</sub> = 10 A) (V <sub>GE</sub> = 5 V, I <sub>C</sub> = 10 A <sub>dc</sub> , T <sub>J</sub> = 175°C)	V <sub>CE(on)</sub>	—		1.9 1.8	V
Forward Transconductance (V <sub>CE</sub> > 15 V, I <sub>C</sub> = 10 A)	g <sub>fs</sub>	8.0	15	—	Mhos

### DYNAMIC CHARACTERISTICS

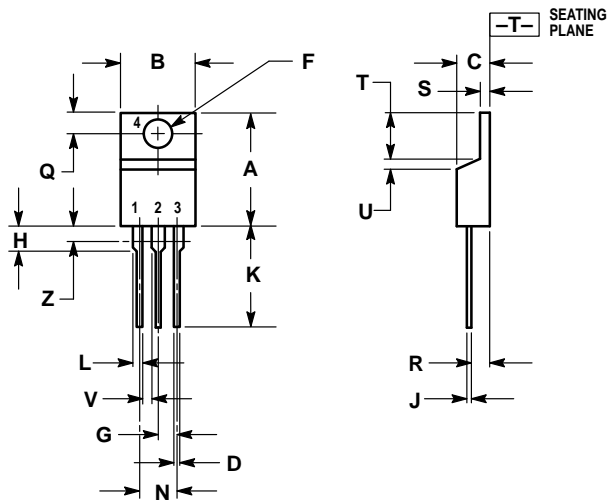
Input Capacitance	(V <sub>CE</sub> = 25 V <sub>dc</sub> , V <sub>GE</sub> = 0 V <sub>dc</sub> , f = 1.0 MHz)	C <sub>iss</sub>	—	430	600	pF
Output Capacitance		C <sub>oss</sub>	—	182	250	
Transfer Capacitance		C <sub>rss</sub>	—	48	100	

### SWITCHING CHARACTERISTICS (1)

Turn-On Delay Time	(V <sub>CC</sub> = 68 V, I <sub>C</sub> = 20 A, V <sub>GE</sub> = 5 V, R <sub>G</sub> = 9.1 Ω)	t <sub>d(on)</sub>	—	TBD	TBD	ns
Rise Time		t <sub>r</sub>	—	TBD	TBD	
Turn-Off Delay Time		t <sub>d(off)</sub>	—	TBD	TBD	
Fall Time		t <sub>f</sub>	—	TBD	TBD	
Total Gate Charge	(V <sub>CC</sub> = 108 V, I <sub>C</sub> = 20 A, V <sub>GE</sub> = 5 V)	Q <sub>g</sub>	—	14	20	nC
Gate-Emitter Charge		Q <sub>gs</sub>	—	3.0	—	
Gate-Collector Charge		Q <sub>gd</sub>	—	6.0	—	

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 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-06  
ISSUE Y

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**How to reach us:**

**USA/EUROPE/Locations Not Listed:** Motorola Literature Distribution;  
P.O. Box 5405, Denver, Colorado 80217. 303-675-2140 or 1-800-441-2447

**JAPAN:** Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, 6F Seibu-Butsuryu-Center,  
3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 81-3-3521-8315

**Mfax™:** RMFAX0@email.sps.mot.com – TOUCHTONE 602-244-6609  
**INTERNET:** <http://Design-NET.com>

**ASIA/PACIFIC:** Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298



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