

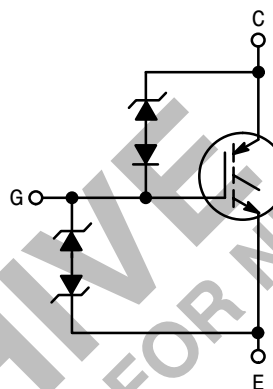
Product Preview

SMARTDISCRETES™

Internally Clamped, N-Channel IGBT

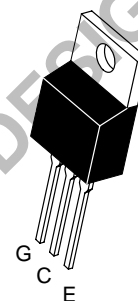
This Logic Level Insulated Gate Bipolar Transistor (IGBT) features Gate–Emitter ESD protection, Gate–Collector overvoltage protection from SMARTDISCRETES™ monolithic circuitry for usage as an **Ignition Coil Driver**.

- 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 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 $T_J = 25^\circ\text{C}$ ($V_{CC} = 80$ V, $V_{GE} = 5$ V, Peak $I_L = 10$ A, $L = 10$ 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 | $^\circ\text{C/W}$ |
| 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) | | |

SMARTDISCRETES is a trademark of Motorola, Inc.

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 ($I_{\text{Clamp}} = 10\text{ mA}$, $T_J = -40$ to 150°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 $\text{mV}/^\circ\text{C}$ |
| Collector–Emitter On–Voltage ($V_{\text{GE}} = 5\text{ V}$, $I_C = 10\text{ A}$) ($V_{\text{GE}} = 5\text{ V}$, $I_C = 10\text{ Adc}$, $T_J = 175^\circ\text{C}$) | $V_{\text{CE}(\text{on})}$ | — — | | 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

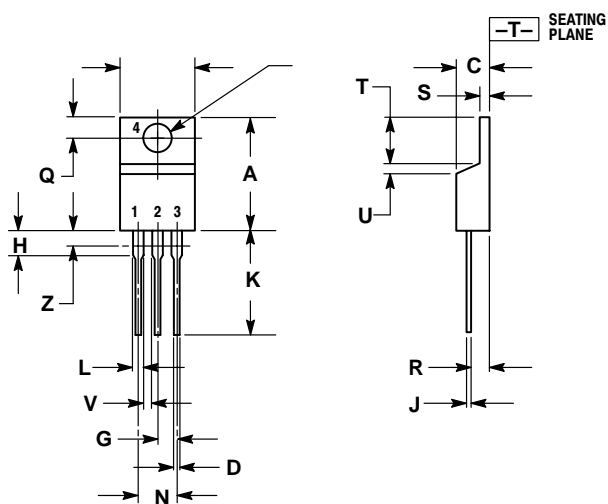
| | | | | | | |
|----------------------|-----------------------------------------------------------------------------------------------|------------------|---|-----|-----|----|
| Input Capacitance | $(V_{\text{CE}} = 25\text{ Vdc}$, $V_{\text{GE}} = 0\text{ Vdc}$, $f = 1.0\text{ MHz}$) | C_{ies} | — | 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

ARCHIVE
RECOMMENDED FOR NEW DESIGN

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

JAPAN: Nippon Motorola Ltd.: SPD, Strategic Planning Office, 141,
4-32-1 Nishi-Gotanda, Shagawa-ku, Tokyo, Japan. 03-5487-8488

Customer Focus Center: 1-800-521-6274

Mfax™: RMFAX0@email.sps.mot.com – TOUCHTONE 1-602-244-6609
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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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