

Product Preview

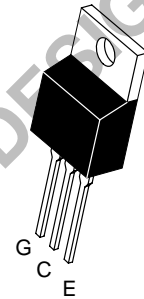
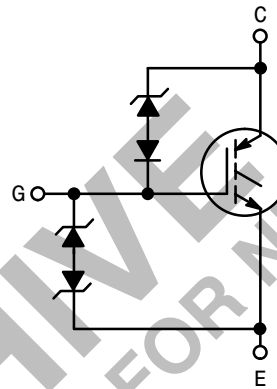
SMARTDISCRETES™
Internally Clamped, N-Channel
IGBT

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) | P_D | 150 | Watts |
| Derate Above 25°C | | 1.0 | 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 $T_J = 25^\circ\text{C}$ ($V_{CC} = 80 \text{ V}, V_{GE} = 5 \text{ V}, \text{Peak } I_L = 10 \text{ A}, L = 10 \text{ mH}$) | E_{AS} | 500 | mJ |

THERMAL CHARACTERISTICS

| | | | |
|---|-----------------|----------------------|--------------------|
| Thermal Resistance — Junction to Case – (TO-220) | $R_{\theta JC}$ | 1.0 | $^\circ\text{C/W}$ |
| — Junction to Ambient | $R_{\theta JA}$ | 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

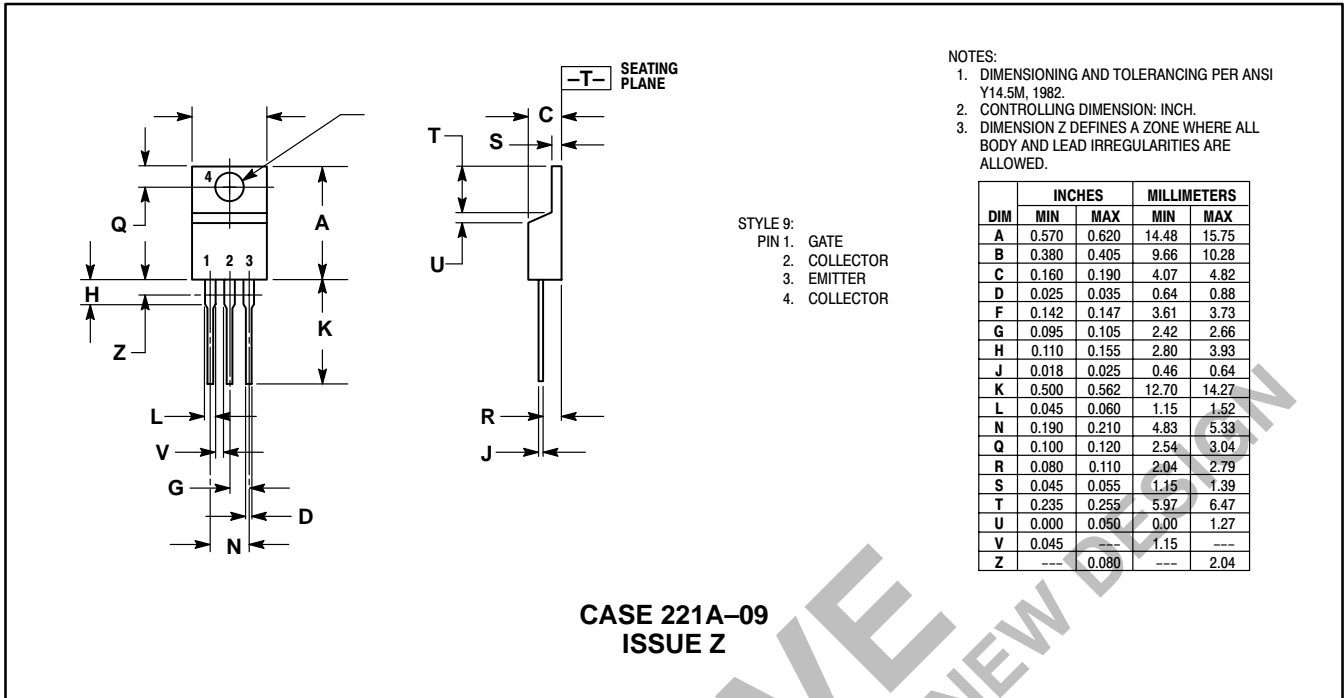
| | | | | | | |
|----------------------|--|------------------|---|-----|-----|----|
| Input Capacitance | $(V_{\text{CE}} = 25 \text{ Vdc}$, $V_{\text{GE}} = 0 \text{ Vdc}$, $f = 1.0 \text{ MHz}$) | C_{ies} | — | 430 | 600 | pF |
| Output Capacitance | | C_{oes} | — | 182 | 250 | |
| Transfer Capacitance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



ARCHIVE
RECOMMENDED FOR NEW DESIGN

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters which may be provided in Motorola data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and  are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

Mfax is a trademark of Motorola, Inc.

How to reach us:

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
Motorola Fax Back System – US & Canada ONLY 1-800-774-1848
– <http://sps.motorola.com/mfax/>

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

HOME PAGE: <http://motorola.com/sps/>

