

Product Preview

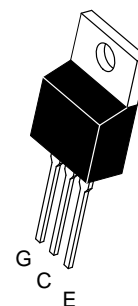
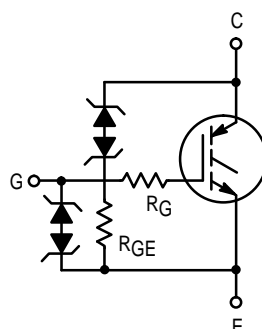
Internally Clamped N-Channel IGBT

This Logic Level Insulated Gate Bipolar Transistor (IGBT) features Gate–Emitter ESD protection, Gate Collector Over–Voltage Protection from 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 Microprocessor Devices
- Low Saturation Voltage
- High Pulsed Current Capability

MGP15N40CL

**15 AMPERES
N–CHANNEL IGBT
V_{CE(on)} = 1.9 V
400 VOLTS
CLAMPED**



**CASE 221A–09
STYLE 9
TO–220AB**

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V _{CES}	CLAMPED	V _{dc}
Collector–Gate Voltage	V _{CER}	CLAMPED	V _{dc}
Gate–Emitter Voltage	V _{GE}	CLAMPED	V _{dc}
Collector Current — Continuous	I _C	15	A _{dc}
Total Power Dissipation Derate above 25°C	P _D	136 0.91	Watts W/°C
Operating and Storage Temperature Range	T _J , T _{stg}	–55 to 175	°C

UNCLAMPED COLLECTOR–TO–EMITTER AVALANCHE CHARACTERISTICS (T_J < 150°C)

Single Pulse Collector–to–Emitter Avalanche Energy	E _{AS}	Value	Unit
V _{CC} = 50 V, V _{GE} = 5.0 V, PEAK I _L = 14.2 A, L = 3.0 mH, Starting T _J = 25°C		300	mJ
V _{CC} = 50 V, V _{GE} = 5.0 V, PEAK I _L = 10 A, L = 3.0 mH, Starting T _J = 150°C		150	

THERMAL CHARACTERISTICS

Thermal Resistance — Junction–to–Case — Junction–to–Ambient	R _{θJC} R _{θJA}	Value	Unit
		1.1 62.5	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T _L	260	°C

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

MGP15N40CL

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector–Emitter Clamp Voltage (I _C = 2.0 mA, T _J = –40°C to 175°C)	V _{(BR)CES}	380	410	440	Vdc
Zero Gate Voltage Collector Current (V _{CE} = 350 V, V _{GE} = 0 V) (V _{CE} = 350 V, V _{GE} = 0 V, T _J = 150°C)	I _{CES}	— —	— —	40 200	μAdc
Gate–Emitter Clamp Voltage (I _G = 5.0 mA)	V _{(BR)GES}	17	—	22	Vdc
Gate–Emitter Leakage Current (V _{GE} = 10 V)	I _{GES}	384	—	1000	μAdc
Gate Resistor (optional)	R _G	—	70	—	Ω
Gate Emitter Resistor (optional)	R _{GE}	10	—	26	kΩ

ON CHARACTERISTICS (1)

Gate Threshold Voltage (V _{GE} = V _{CE} , I _C = 1.0 mA) Threshold Temperature Coefficient (Negative)	V _{GE(th)}	1.0 —	1.8 4.4	2.1 —	Vdc mV/°C
Collector–to–Emitter On–Voltage (V _{GE} = 4.0 V, I _C = 6.0 A) (V _{GE} = 4.5 V, I _C = 10 A, T _J = 150°C)	V _{CE(on)}	— —	— —	1.8 1.8	Volts
Forward Transconductance (V _{CE} = 5.0 V, I _C = 6.0 A)	g _{fe}	8.0	15	—	Mhos

DYNAMIC CHARACTERISTICS

Input Capacitance	(V _{CC} = 15 V, V _{GE} = 0 V, f = 1.0 MHz)	C _{ies}	—	750	—	pF
Output Capacitance		C _{oes}	—	600	—	
Transfer Capacitance		C _{res}	—	130	—	

SWITCHING CHARACTERISTICS (1)

Turn–Off Delay Time	(V _{CC} = 380 V, I _C = 6.5 A, R _G = 1.0 kΩ, L = 300 μH)	t _{d(off)}	—	4.0	—	μSec
Fall Time		t _f	—	6.0	—	
Turn–On Delay Time	(V _{CC} = 10 V, I _C = 6.5 A, R _G = 1.0 kΩ, R _L = 1.0 Ω)	t _{d(on)}	—	2.0	—	μSec
Rise Time		t _r	—	4.0	—	
Gate Charge	(V _{CC} = 350 V, I _C = 15 A, V _{GE} = 5.0 V)	Q _T	—	19	—	nC
		Q ₁	—	4.0	—	
		Q ₂	—	13	—	

(1) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

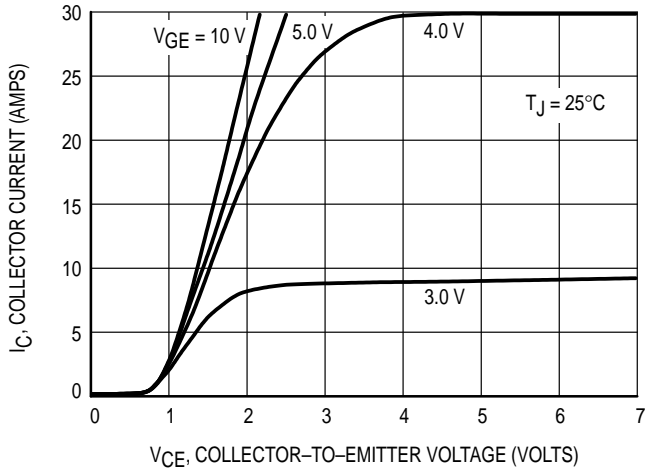


Figure 1. Output Characteristics

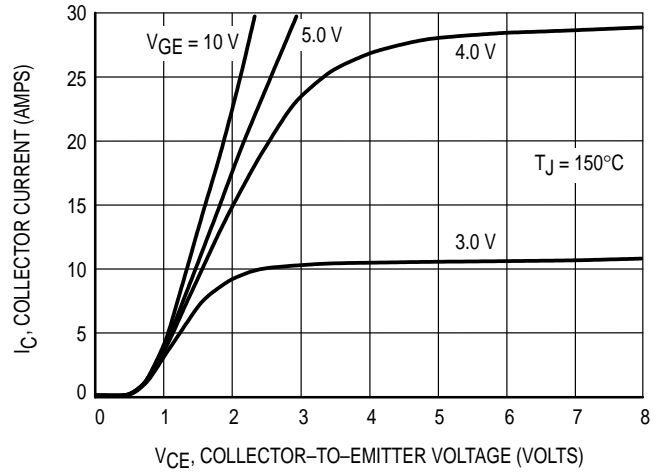


Figure 2. Output Characteristics

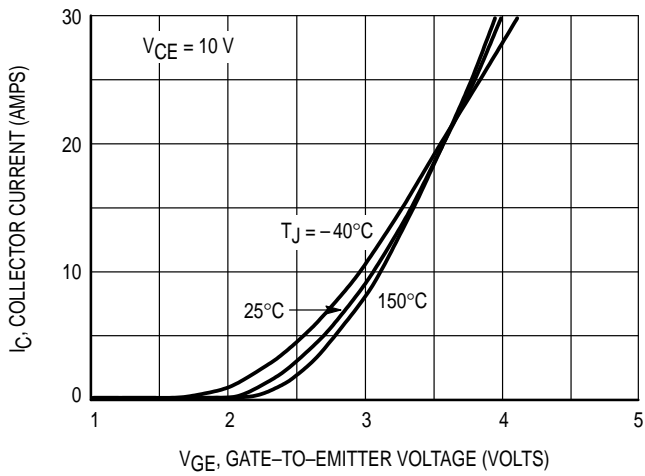


Figure 3. Transfer Characteristics

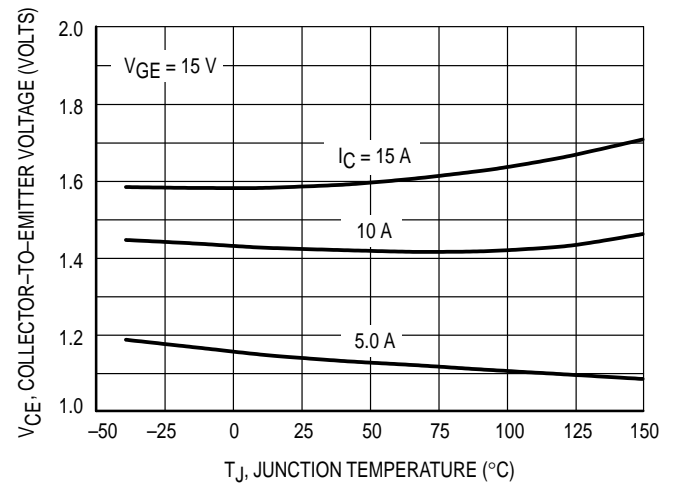


Figure 4. Collector-to-Emitter Saturation Voltage versus Junction Temperature

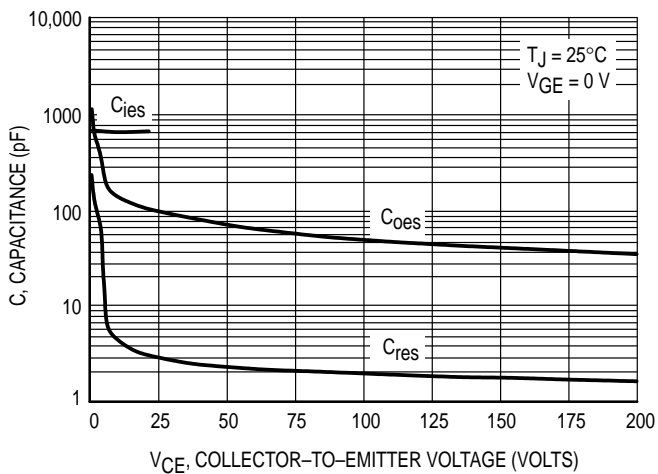


Figure 5. Capacitance Variation

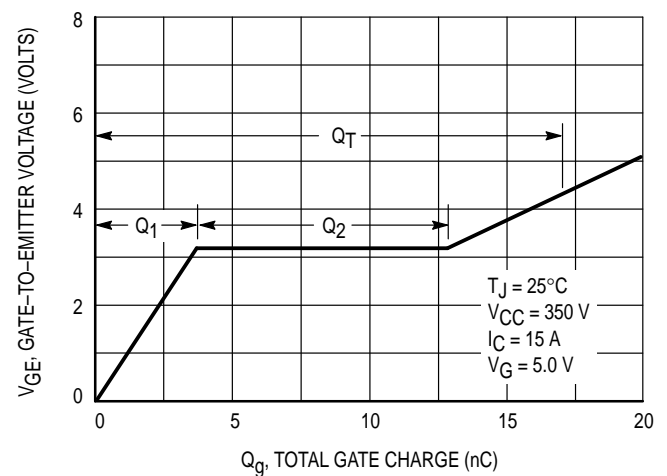


Figure 6. Gate-to-Emitter Voltage versus Total Charge

MGP15N40CL

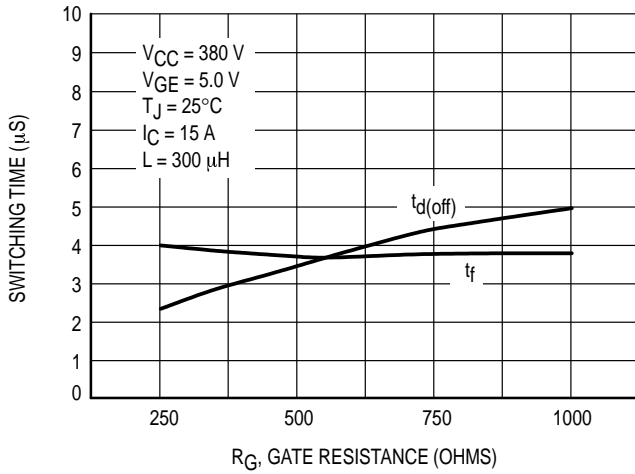


Figure 7. Switching Speed versus Gate Resistance

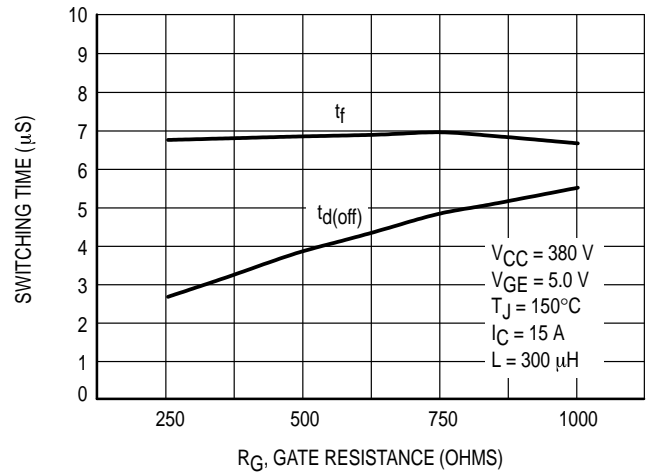


Figure 8. Switching Speed versus Gate Resistance

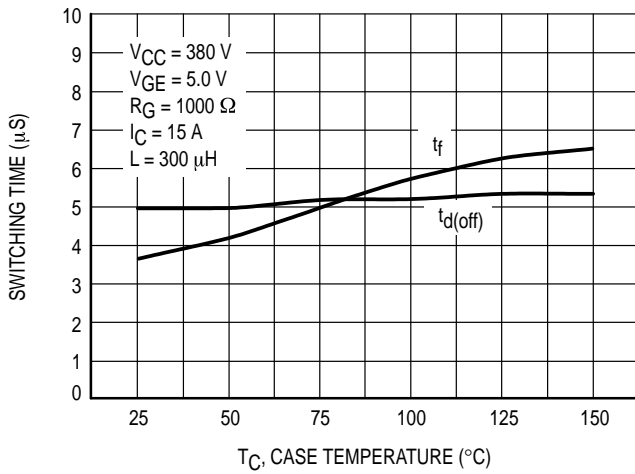


Figure 9. Switching Speed versus Case Temperature

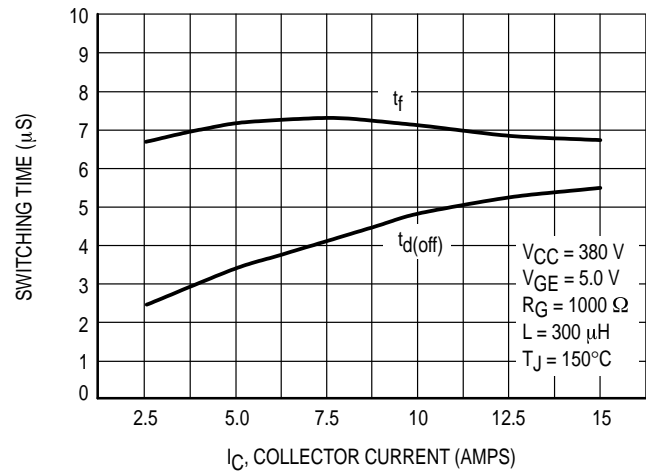


Figure 10. Total Switching Losses versus Collector Current

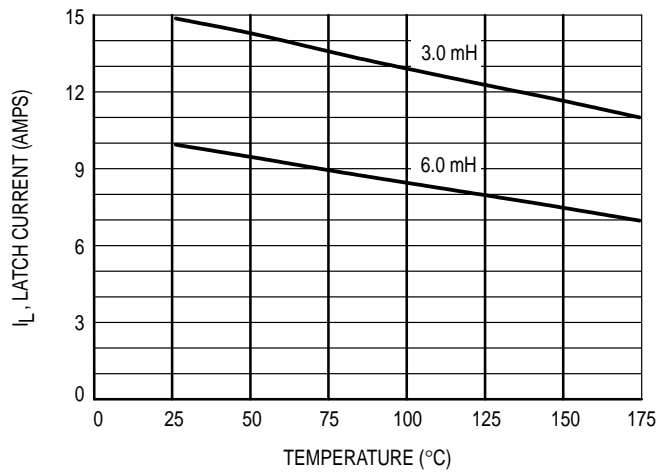


Figure 11. Latch Current versus Temperature

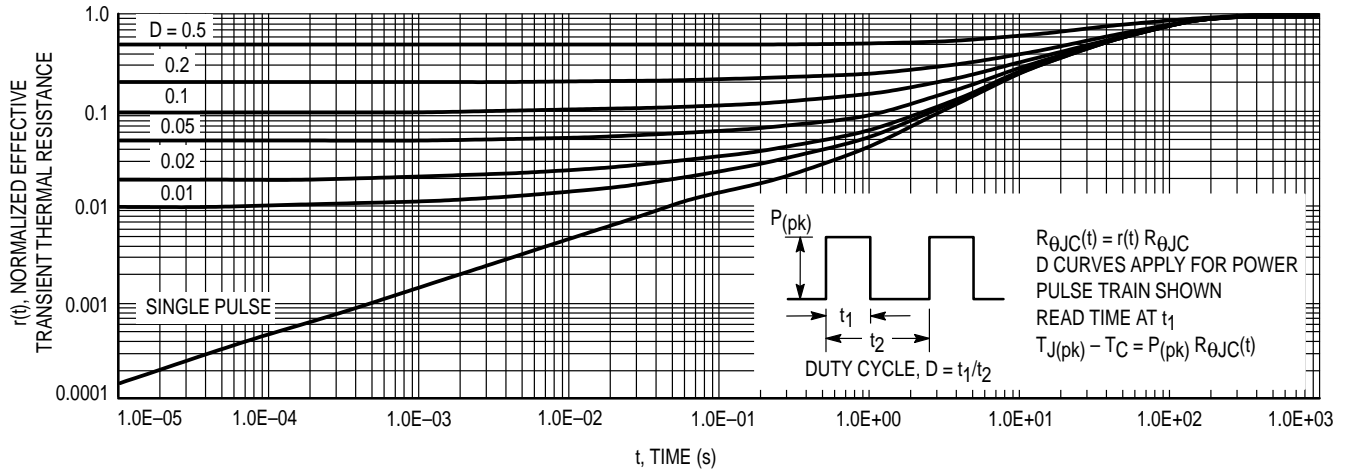
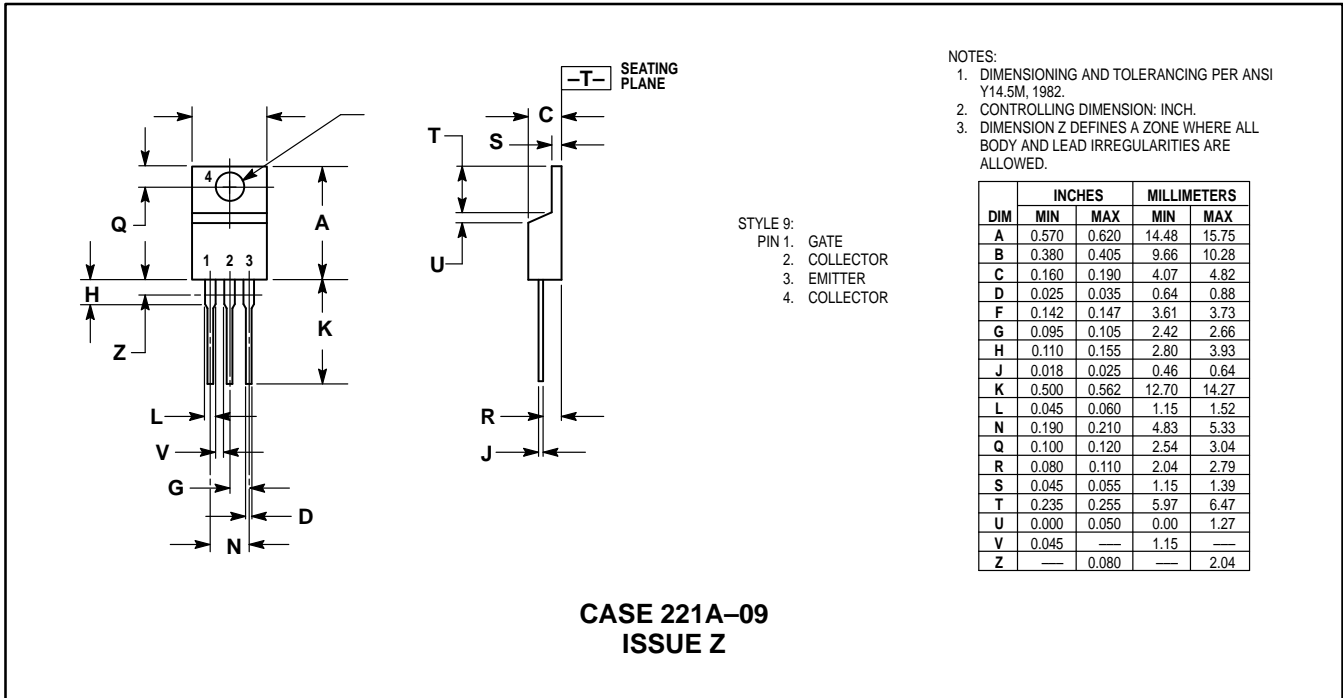


Figure 12. Thermal Response

PACKAGE DIMENSIONS



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/>

