MGP15N43CL, MGB15N43CL

Preferred Device

Ignition IGBT
15 Amps, 430 Volts
N–Channel TO–220 and D^{2}PAK

This Logic Level Insulated Gate Bipolar Transistor (IGBT) features monolithic circuitry integrating ESD and Over–Voltage clamped protection for use in inductive coil drivers applications. Primary uses include Ignition, Direct Fuel Injection, or wherever high voltage and high current switching is required.

- Gate–Emitter ESD Protection
- Temperature Compensated Gate–Collector Voltage 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

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

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V_{CES}	460	V_{DC}
Collector–Gate Voltage	V_{CER}	460	V_{DC}
Gate–Emitter Voltage	V_{GE}	22	V_{DC}
Collector Current–Continuous @ T_C = 25°C	I_C	15	A_{DC}
Total Power Dissipation @ T_C = 25°C Derate above 25°C	P_D	136 1.0	Watts W/°C
Operating and Storage Temperature Range	T_J, T_{stg}	–55 to 175	°C

UNCLAMPED DRAIN–TO–SOURCE AVALANCHE CHARACTERISTICS (T_J < 150°C)

Characteristic	Symbol	Value	Unit
Single Pulse Collector–to–Emitter Avalanche Energy V_{CC} = 50 V, V_{GE} = 5 V, Pk I_L = 14.2 A, L = 3 mH, Starting T_J = 25°C V_{CC} = 50 V, V_{GE} = 5 V, Pk I_L = 10 A, L = 3 mH, Starting T_J = 150°C	E_{AS}	 300 150	mJ

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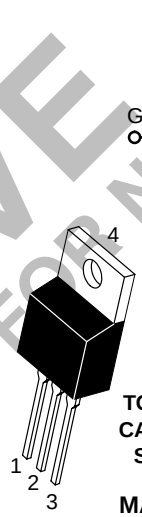
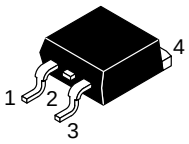
15 AMPERES
430 VOLTS (Clamped)
$V_{CE(on)}$ = 1.8 mΩ

N–Channel

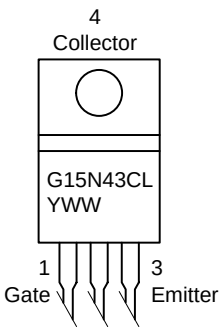


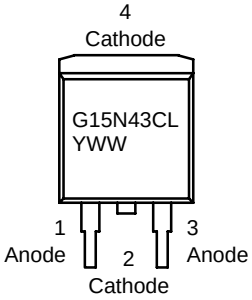
TO–220AB
CASE 221A
STYLE 9



D^{2}PAK
CASE 418B
STYLE 3

MARKING DIAGRAMS & PIN ASSIGNMENTS





G15N43CL = Device Code
Y = Year
WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping
MGP15N43CL	TO–220	50 Units/Rail
MGB15N43CLT4	D2PAK	800 Tape & Reel

Preferred devices are recommended choices for future use and best overall value.

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THERMAL CHARACTERISTICS

Characteristic		Symbol	Value	Unit
Thermal Resistance, Junction to Case		$R_{\theta JC}$	1.0	°C/W
Thermal Resistance, Junction to Ambient	TO–220	$R_{\theta JA}$	62.5	
	D^2PAK	$R_{\theta JA}$	50	
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 5 seconds		T_L	275	°C

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

Characteristic	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector–Emitter Clamp Voltage	BV_{CES}	I_C = 2 mA T_J = –40°C to 175°C	400	430	460	V_{DC}
Zero Gate Voltage Collector Current	I_{CES}	V_{CE} = 300 V, V_{GE} = 0, T_J = 25°C	–	–	40	μA_{DC}
		V_{CE} = 300 V, V_{GE} = 0, T_J = 150°C	–	–	200	
Reverse Collector–Emitter Leakage Current	I_{ECS}	V_{CE} = –24 V	–	–	1.0	mA
Gate–Emitter Clamp Voltage	BV_{GES}	I_G = 5 mA	17	–	22	V_{DC}
Gate–Emitter Leakage Current	I_{GES}	V_{GE} = 10 V	–	–	2.0	μA_{DC}
ON CHARACTERISTICS (Note 1.)						
Gate Threshold Voltage	$V_{GE(th)}$	I_C = 1 mA V_{GE} = V_{CE}	1.2	1.5	2.1	V_{DC}
Threshold Temperature Coefficient (Negative)	–	–	–	4.4	–	mV/°C
Collector–to–Emitter On–Voltage	$V_{CE(on)}$	I_C = 6 A, V_{GE} = 4 V	–	–	1.8	V_{DC}
Collector–to–Emitter On–Voltage	$V_{CE(on)}$	I_C = 10 A, V_{GE} = 4.5 V, T_J = 150°C	–	–	1.8	V_{DC}
Forward Transconductance	gfs	V_{CE} = 5 V, I_C = 6 A	8.0	15	–	Mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ISS}	V_{CC} = 15 V	–	950	–	pF
Output Capacitance	C_{OSS}	V_{GE} = 0 V	–	100	–	
Transfer Capacitance	C_{RSS}	f = 1 MHz	–	8.0	–	
SWITCHING CHARACTERISTICS (Note 1.)						
Turn–Off Delay Time	$t_{d(off)}$	V_{CC} = 300 V, I_C = 10 A	–	14	–	µSec
Fall Time	t_f	R_G = 1 kΩ, L = 300 µH	–	7.0	–	
Turn–On Delay Time	$t_{d(on)}$	V_{CC} = 10 V, I_C = 6.5 A	–	0.5	–	µSec
Rise Time	t_r	R_G = 1 kΩ, R_L = 1 Ω	–	4.5	–	
Gate Charge	Q_T	V_{CC} = 300 V	–	TBD	–	nC
	Q_1	I_C = 15 A	–	TBD	–	
	Q_2	V_{GE} = 5 V	–	TBD	–	

1. Pulse Test: Pulse Width ≤ 300 µS, Duty Cycle ≤ 2%.

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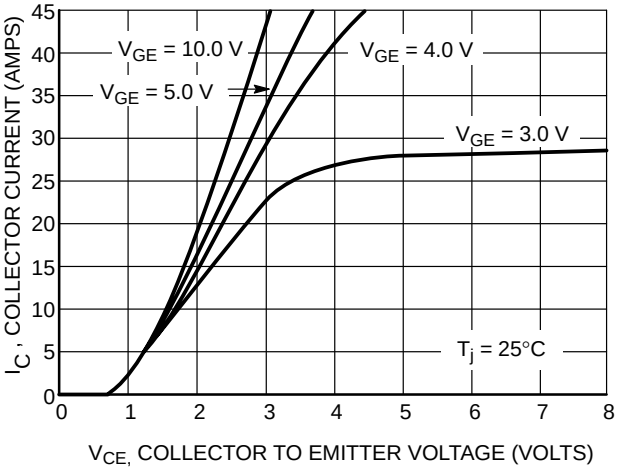

Figure 1. Output Characteristics

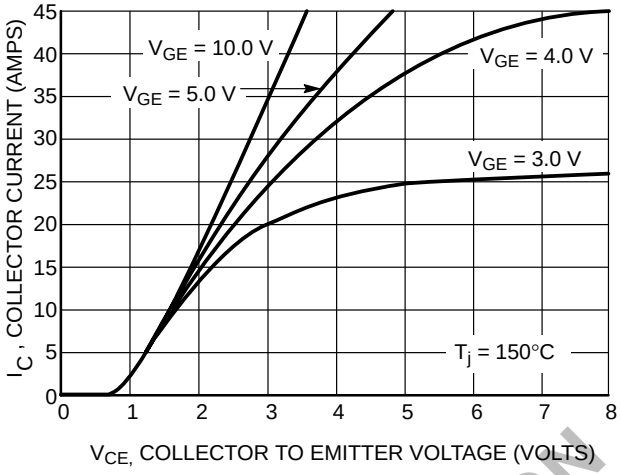

Figure 2. Output Characteristics

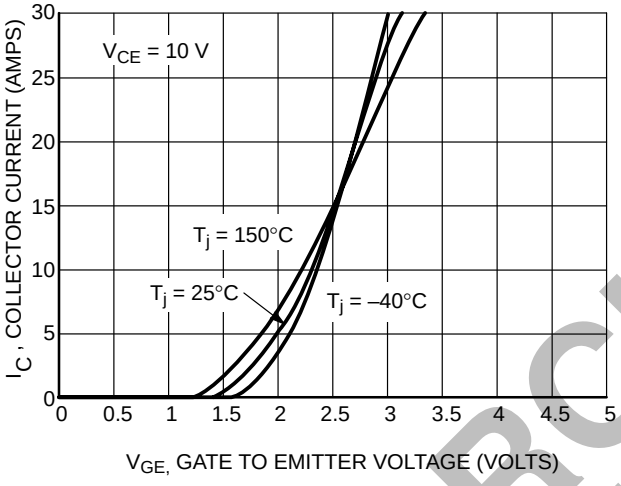

Figure 3. Transfer Characteristics

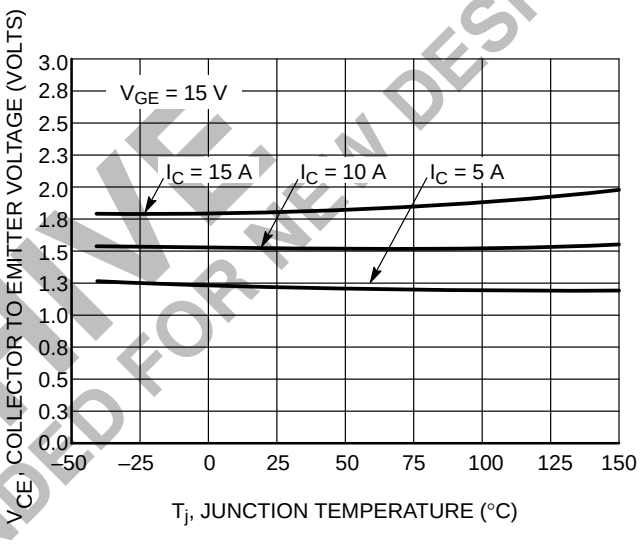

Figure 4. Collector–to–Emitter Saturation Voltage versus Junction Temperature

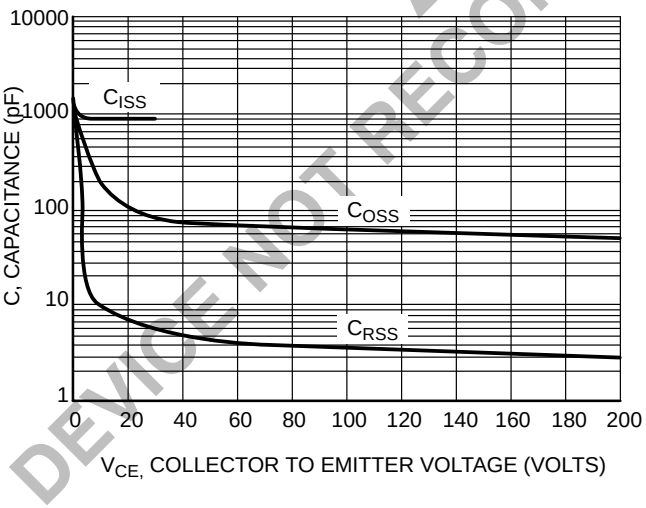

Figure 5. Capacitance Variation

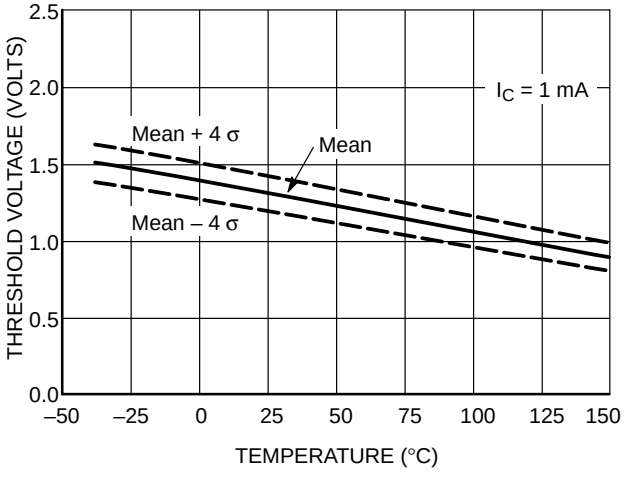

Figure 6. Threshold Voltage versus Temperature

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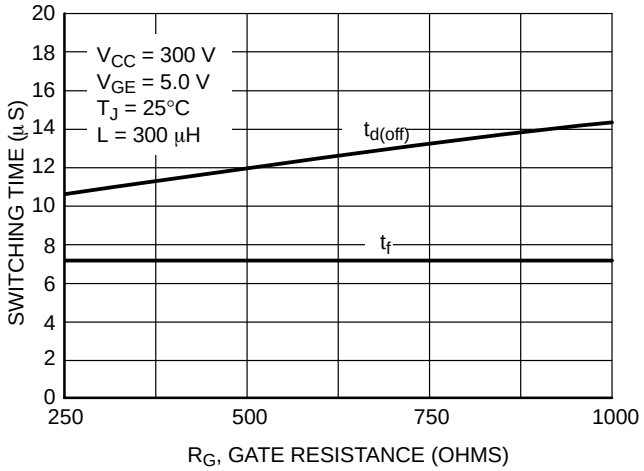

Figure 7. Switching Speed versus Gate Resistance

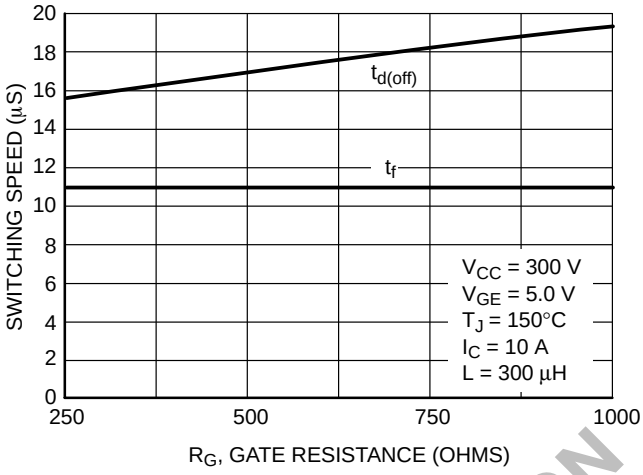

Figure 8. Switching Speed versus Gate Resistance

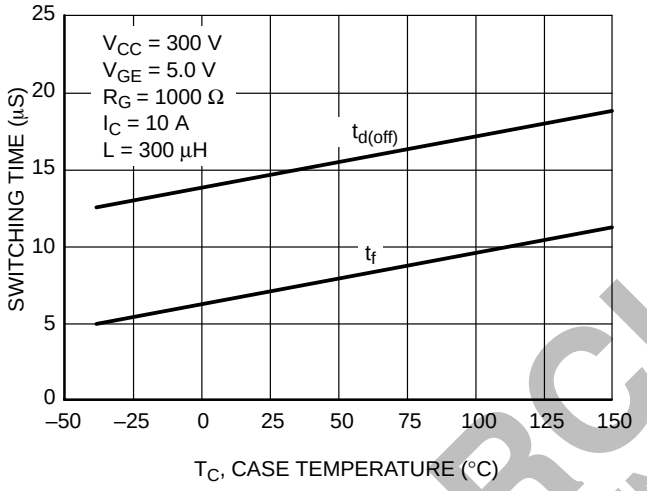

Figure 9. Switching Speed versus Case Temperature

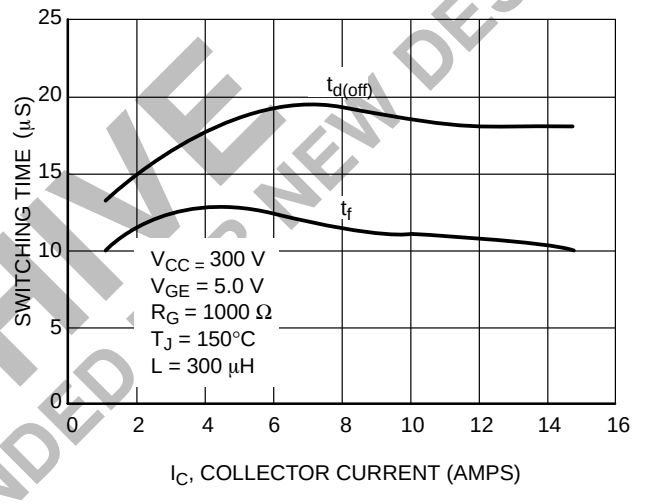

Figure 10. Total Switching Losses versus Collector Current

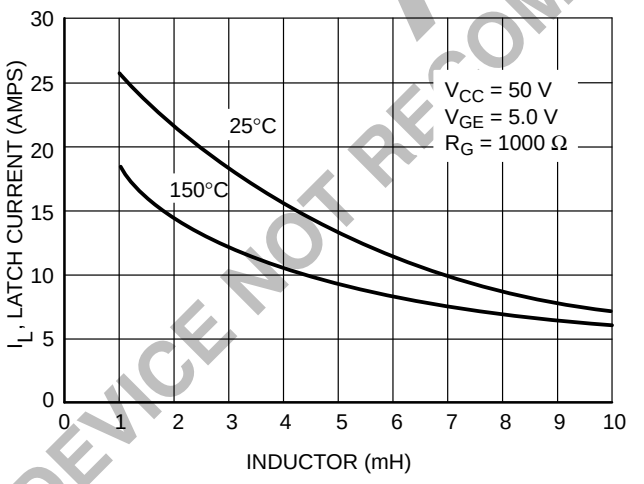

Figure 11. Latch Current versus Inductor (Typical)

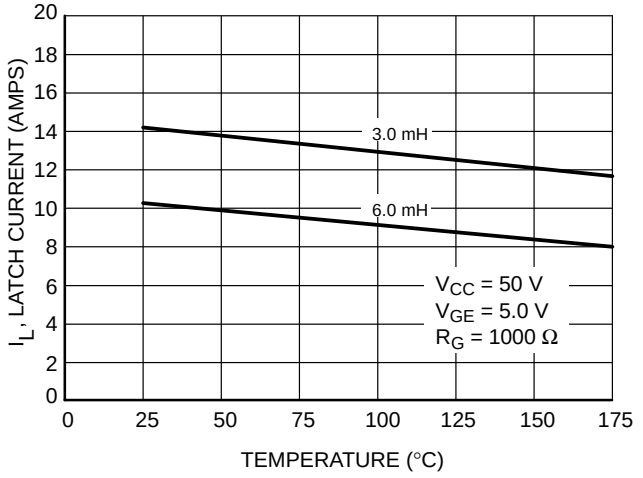

Figure 12. Latch Current versus Temperature (Typical)

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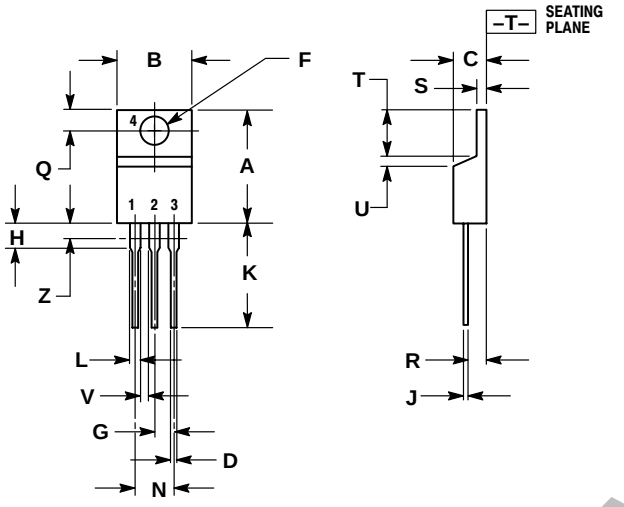
PACKAGE DIMENSIONS

TO–220 THREE–LEAD
TO–220AB
CASE 221A–09
ISSUE AA



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.

	INCHES		MILLIMETERS	
DIM	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

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

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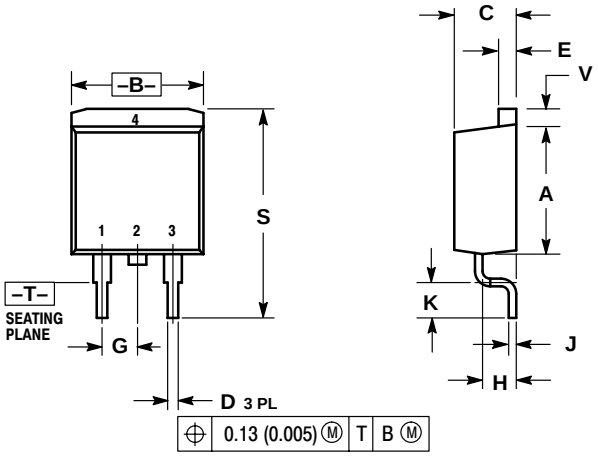
PACKAGE DIMENSIONS

D²PAK
CASE 418B–03
ISSUE D



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
G	0.100 BSC		2.54 BSC	
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
S	0.575	0.625	14.60	15.88
V	0.045	0.055	1.14	1.40

STYLE 3:
PIN 1. ANODE
2. CATHODE
3. ANODE
4. CATHODE

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Notes

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