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June 2016

FGB3056_F085

EcoSPARK[®] 300mJ, 560V, N-Channel Ignition IGBT

Features

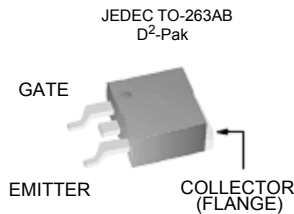
- SCIS Energy = 300mJ at $T_J = 25^\circ\text{C}$
- Logic Level Gate Drive

Applications

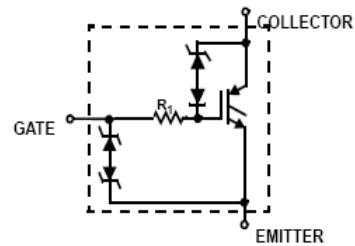
- Automotive Ignition Coil Driver Circuits
- Coil On Plug Applications



Package



Symbol



Absolute Maximum Ratings $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Rated	Units
BV_{CER}	Collector to Emitter Breakdown Voltage ($I_C = 2\text{mA}$)	560	V
BV_{ECS}	Emitter to Collector Voltage - Reverse Battery Condition ($I_C = -20\text{mA}$)	20	V
E_{SCIS25}	$I_{SCIS} = 14.2\text{A}$, $L = 3.0\text{mHy}$, $R_{GE} = 1\text{K}\Omega$ $T_C = 25^\circ\text{C}$	300	mJ
$E_{SCIS150}$	$I_{SCIS} = 10.8\text{A}$, $L = 3.0\text{mHy}$, $R_{GE} = 1\text{K}\Omega$ $T_C = 150^\circ\text{C}$	170	mJ
I_{C25}	Collector Current Continuous, at $V_{GE} = 5\text{V}$, $T_C = 25^\circ\text{C}$	29	A
I_{C110}	Collector Current Continuous, at $V_{GE} = 5\text{V}$, $T_C = 110^\circ\text{C}$	24	A
V_{GEM}	Gate to Emitter Voltage Continuous	± 10	V
P_D	Power Dissipation Total, at $T_C = 25^\circ\text{C}$ $T_C = 25^\circ\text{C}$	200	W
	Power Dissipation Derating, for $T_C > 25^\circ\text{C}$ $T_C > 25^\circ\text{C}$	1.33	W/ $^\circ\text{C}$
T_J	Operating Junction Temperature Range	-40 to +175	$^\circ\text{C}$
T_{STG}	Storage Junction Temperature Range	-40 to +175	$^\circ\text{C}$
T_L	Max. Lead Temp. for Soldering (Leads at 1.6mm from case for 10s)	300	$^\circ\text{C}$
T_{PKG}	Reflow soldering according to JESD020C	260	$^\circ\text{C}$
ESD	HBM-Electrostatic Discharge Voltage at 100pF, 1500 Ω	4	kV

FGB3056_F085 EcoSPARK[®] 300mJ, 560V, N-Channel Ignition IGBT

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case	0.75	°C/W
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Electrical Characteristics of the IGBT $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Off State Characteristics

BV_{CER}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0V, I_{CE} = 2mA,$ $R_{GE} = 1K\Omega,$ $T_J = -40 \text{ to } 150^\circ\text{C}$	530	560	600	V	
BV_{CES}	Collector to Emitter Breakdown Voltage	$V_{GE} = 0V, I_{CE} = 10mA,$ $R_{GE} = 0\Omega,$ $T_J = -40 \text{ to } 150^\circ\text{C}$	-	595	-	V	
BV_{ECS}	Emitter to Collector Breakdown Voltage	$V_{GE} = 0V, I_{CE} = -75mA,$ $T_J = 25^\circ\text{C}$	20	26	-	V	
BV_{GES}	Gate to Emitter Breakdown Voltage	$I_{GES} = \pm 5mA$	± 12	± 14	-	V	
I_{CER}	Collector to Emitter Leakage Current	$V_{CE} = 250V, R_{GE} = 1K\Omega$	$T_J = 25^\circ\text{C}$	-	-	40	μA
			$T_J = 150^\circ\text{C}$	-	-	1	mA
I_{ECS}	Emitter to Collector Leakage Current	$V_{EC} = 20V$	$T_J = 25^\circ\text{C}$	-	-	1	mA
			$T_J = 150^\circ\text{C}$	-	-	40	
R_1	Series Gate Resistance		-	100	-	Ω	

On State Characteristics

$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	$V_{GE} = 5V, I_{CE} = 2A$	$T_J = 25^\circ\text{C}$	-	1.0	1.1	V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	$V_{GE} = 5V, I_{CE} = 8A$	$T_J = 150^\circ\text{C}$	-	1.3	1.55	V

Dynamic Characteristics

$Q_{G(ON)}$	Gate Charge	$V_{GE} = 5V, V_{CE} = 12V, I_{CE} = 10A$	-	15.6	20	nC	
$V_{GE(TH)}$	Gate to Emitter Threshold Voltage	$I_{CE} = 1mA, V_{CE} = V_{GE},$	$T_J = 25^\circ\text{C}$	1.3	1.6	2.2	V
			$T_J = 150^\circ\text{C}$	-	1.1	-	
V_{GEP}	Gate to Emitter Plateau Voltage	$V_{CE} = 12V, I_{CE} = 10A$	-	2.8	-	V	

Switching Characteristics

$t_{d(ON)R}$	Current Turn-On Delay Time-Resistive	$V_{CE} = 14V, R_L = 1\Omega$	-	0.8	1.3	μs
t_{rR}	Current Rise Time-Resistive	$V_{GE} = 5V, R_G = 1K\Omega$	-	1.48	2.4	μs
$t_{d(OFF)L}$	Current Turn-Off Delay Time-Inductive	$V_{CE} = 300V, L = 1mH,$	-	5.1	8.2	μs
t_{fL}	Current Fall Time-Inductive	$V_{GE} = 5V, R_G = 1K\Omega$	-	1.1	1.8	μs

Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGB3056	FGB3056_F085	TO-263AB	330mm	24mm	800units

Typical Performance Curves

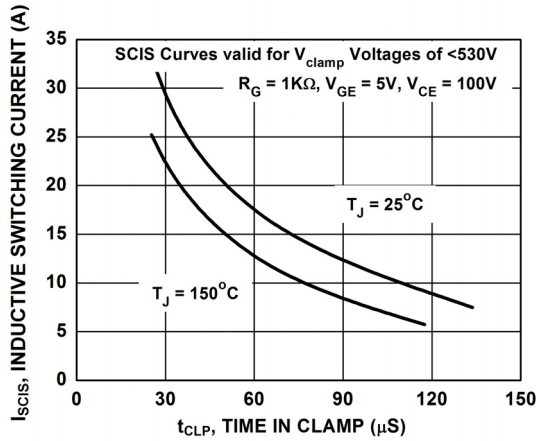


Figure 1. Self Clamped Inductive Switching Current vs. Time in Clamp

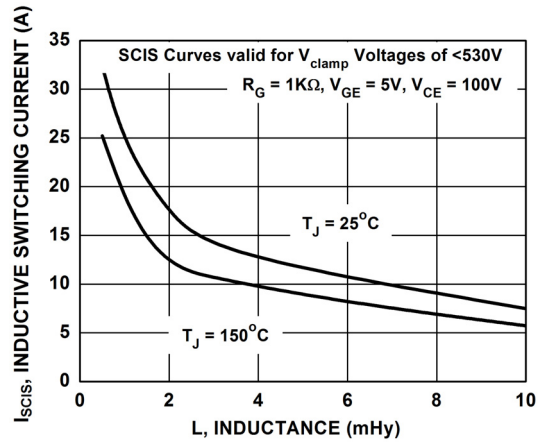


Figure 2. Self Clamped Inductive Switching Current vs. Inductance

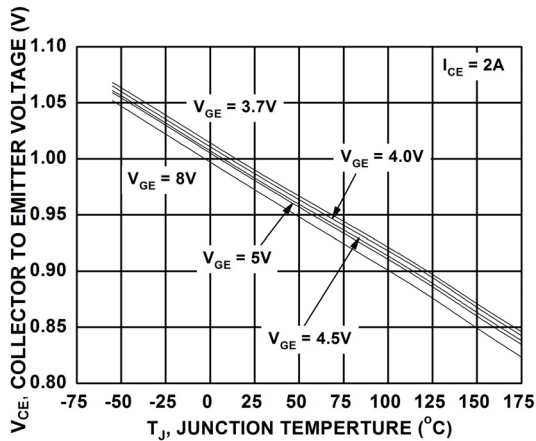


Figure 3. Collector to Emitter On-State Voltage vs. Junction Temperature

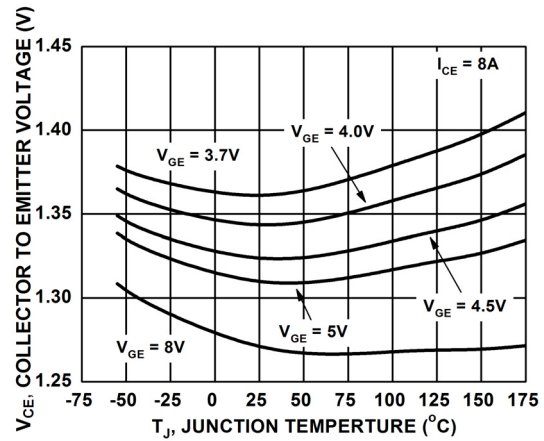


Figure 4. Collector to Emitter On-State Voltage vs. Junction Temperature

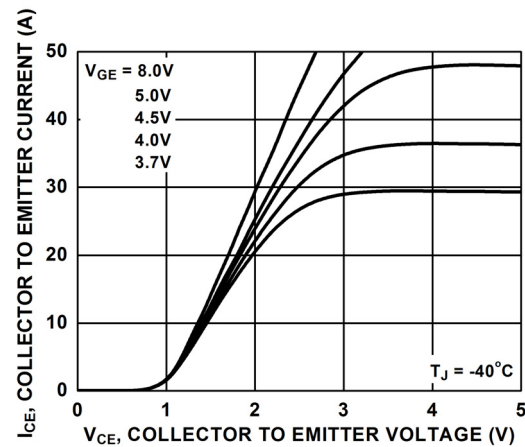


Figure 5. Collector to Emitter On-State Voltage vs. Collector Current

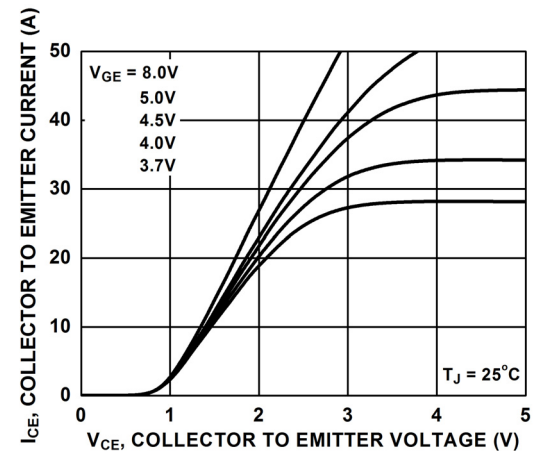


Figure 6. Collector to Emitter On-State Voltage vs. Collector Current

Typical Performance Curves (Continued)

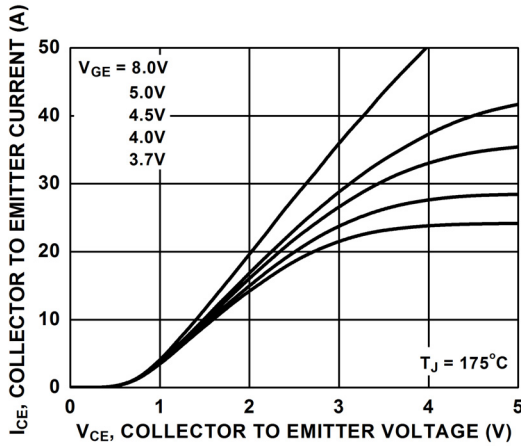


Figure 7. Collector to Emitter On-State Voltage vs. Collector Current

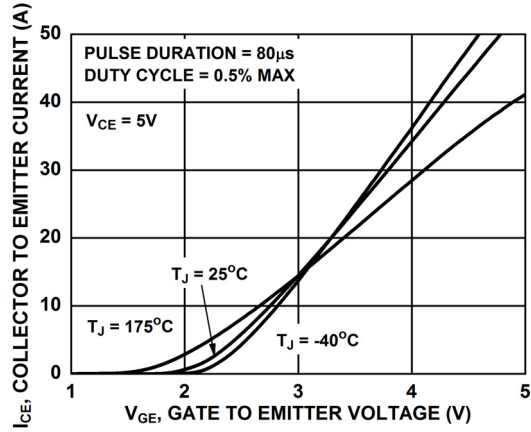


Figure 8. Transfer Characteristics

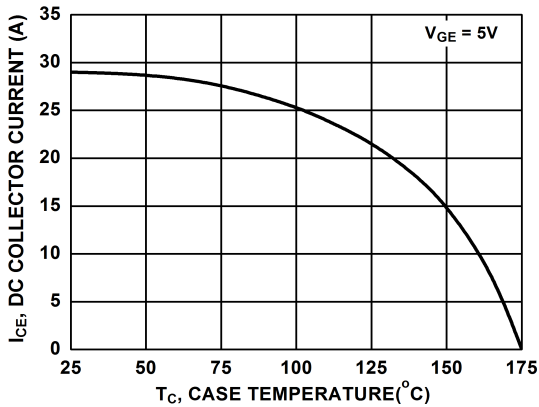


Figure 9. DC Collector Current vs. Case Temperature

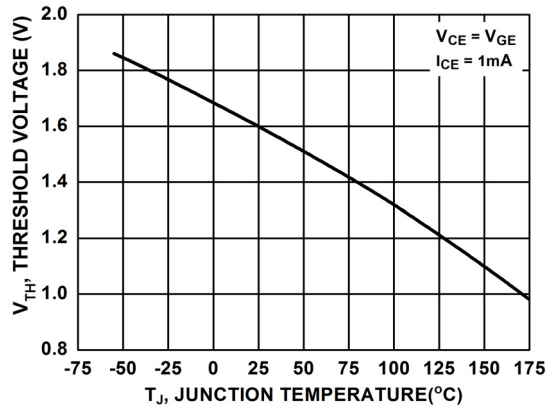


Figure 10. Threshold Voltage vs. Junction Temperature

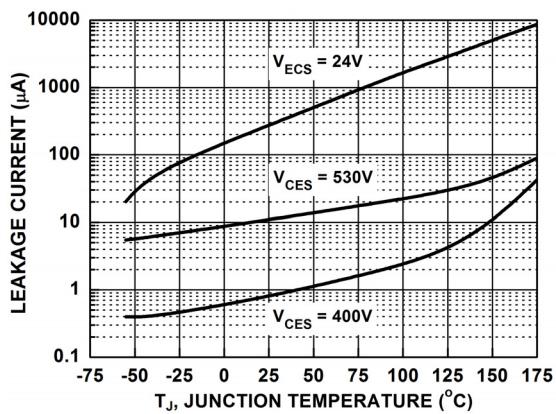


Figure 11. Leakage Current vs. Junction Temperature

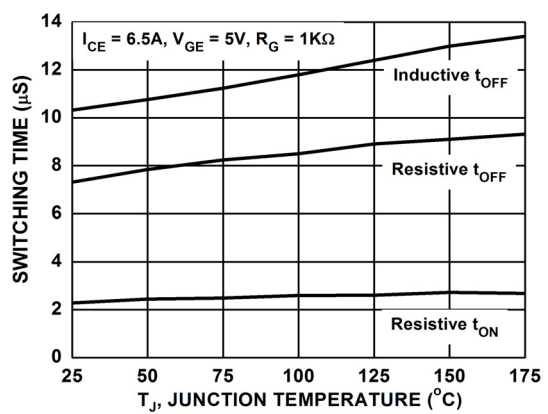


Figure 12. Switching Time vs. Junction Temperature

Typical Performance Curves (Continued)

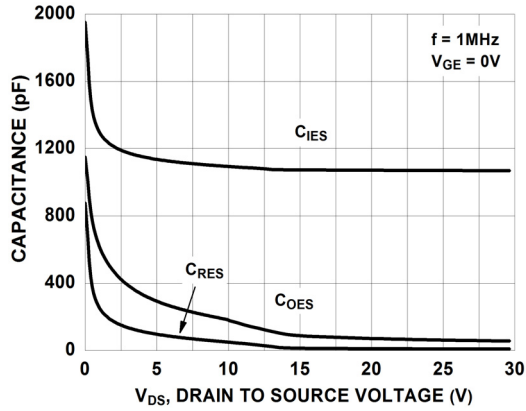


Figure 13. Capacitance vs. Collector to Emitter Voltage

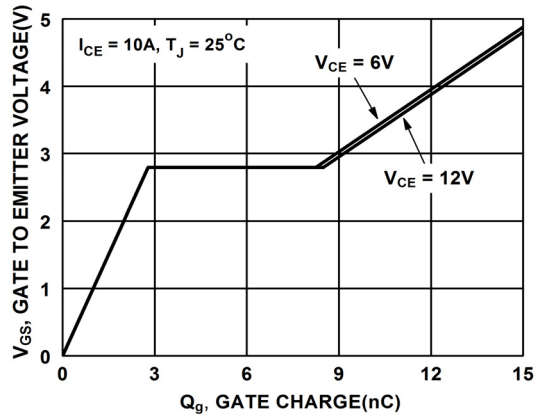


Figure 14. Gate Charge

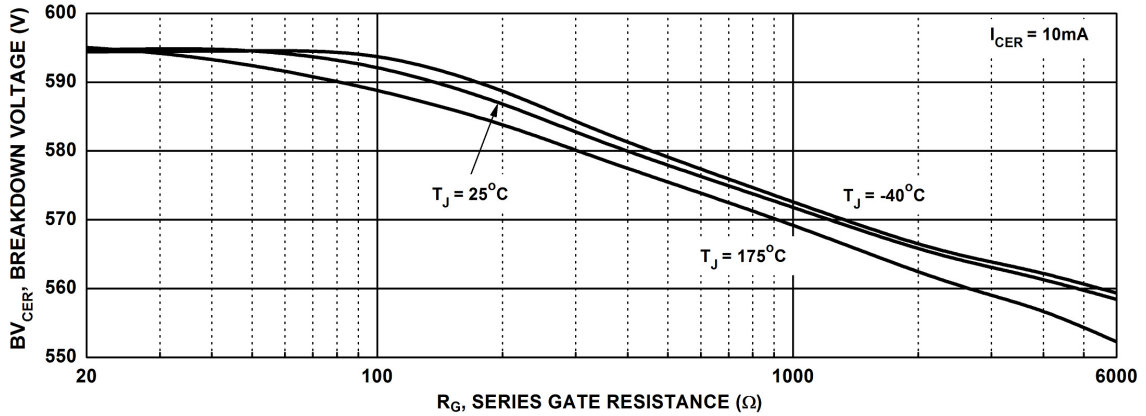


Figure 15. Break down Voltage vs. Series Gate Resistance

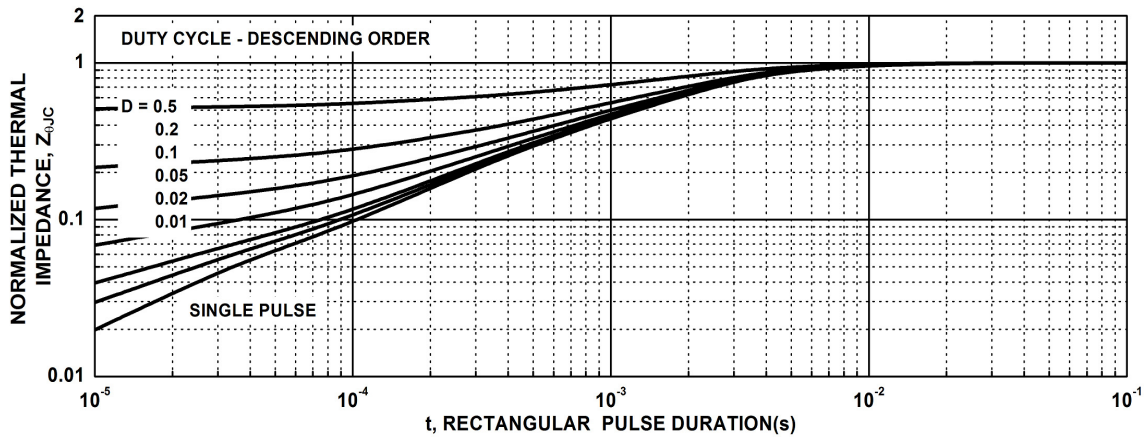


Figure 16. IGBT Normalized Transient Thermal Impedance, Junction to Case

Typical Performance Curves

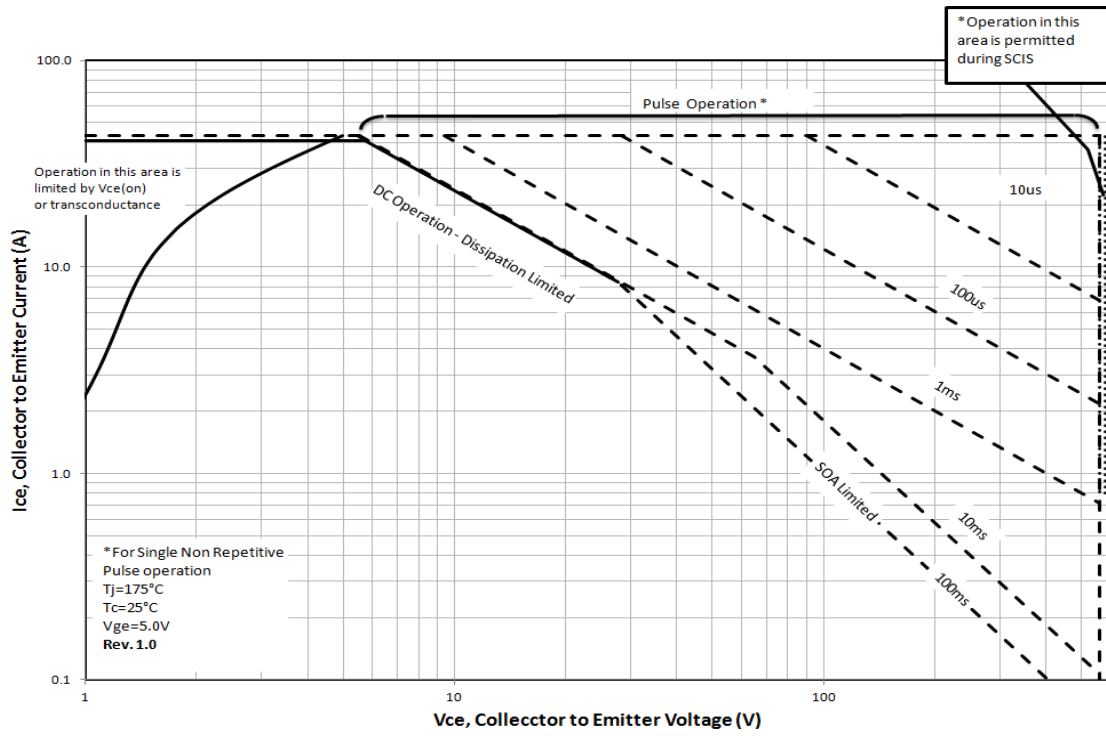
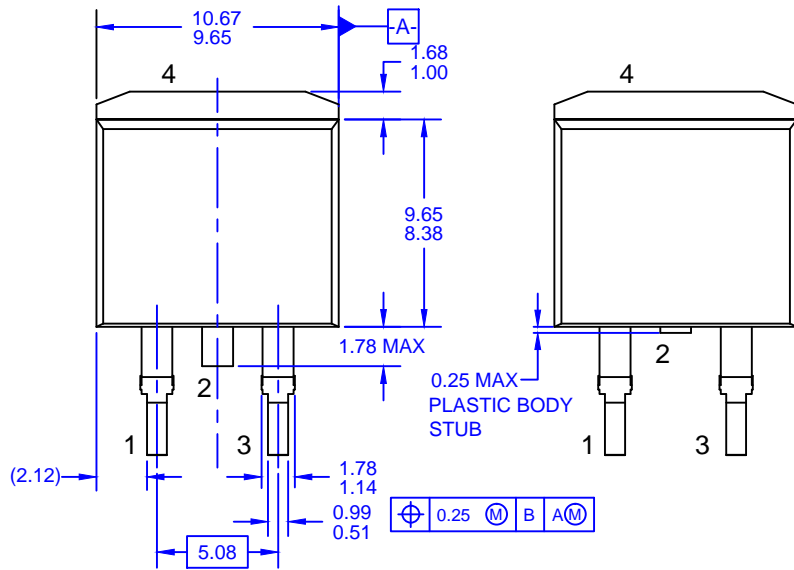
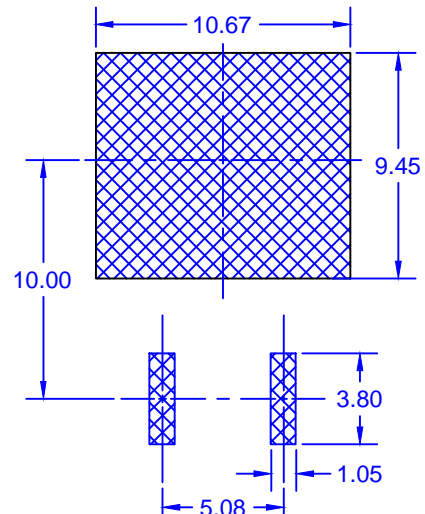


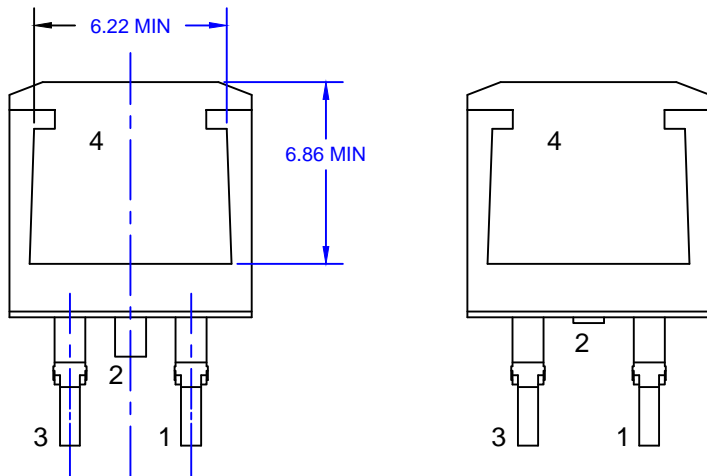
Figure 17. Forward Safe Operating Area



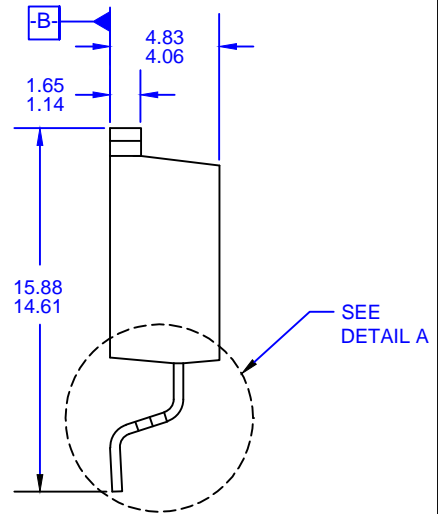
FRONT VIEW - DIODE PRODUCTS VERSION
ALTERNATIVE SUPPLIER DETAIL



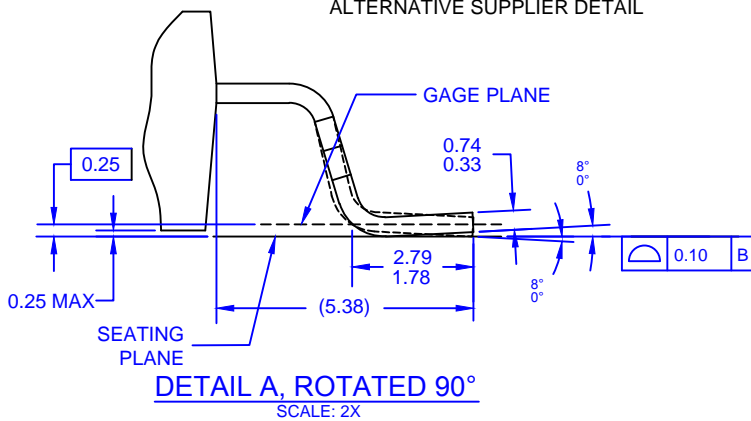
LAND PATTERN RECOMMENDATION
UNLESS NOTED, ALL DIMS TYPICAL



BACK VIEW - DIODE PRODUCTS VERSION
ALTERNATIVE SUPPLIER DETAIL



SEE
DETAIL A



DETAIL A, ROTATED 90°
SCALE: 2X

NOTES: UNLESS OTHERWISE SPECIFIED

- A) ALL DIMENSIONS ARE IN MILLIMETERS.
- B) REFERENCE JEDEC, TO-263, VARIATION AB.
- C) DIMENSIONING AND TOLERANCING PER DIMENSIONING AND TOLERANCING PER ASME Y14.5 - 2009.
- D) LOCATION OF THE PIN HOLE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE).
- E) LANDPATTERN RECOMMENDATION PER IPC TO254P1524X482-3N
- F) FILENAME: TO263A02REV8



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