



ON Semiconductor®

FGD3325G2-F085

EcoSPARK[®]2 330mJ, 250V, N-Channel Ignition IGBT

Features

- SCIS Energy = 330mJ at $T_j = 25^\circ\text{C}$
- Logic Level Gate Drive
- Qualified to AEC Q101
- RoHS Compliant

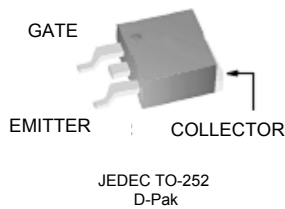
Applications

- Automotive Ignition Coil Driver Circuits
- Coil On Plug Applications

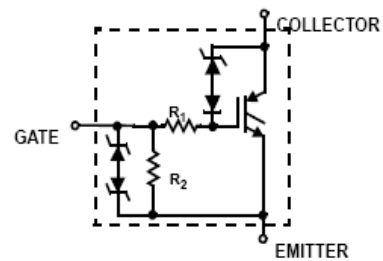


FGD3325G2-F085 EcoSPARK[®]2 330mJ, 250V, N-Channel Ignition IGBT

Package



Symbol



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

Symbol	Parameter	Ratings	Units	
BV_{CER}	Collector to Emitter Breakdown Voltage ($I_C = 1\text{mA}$)	250	V	
BV_{ECS}	Emitter to Collector Voltage - Reverse Battery Condition ($I_C = 10\text{mA}$)	28	V	
E_{SCIS25}	$I_{SCIS} = 14.8\text{A}$, $L = 3.0\text{mH}$, $R_{GE} = 1\text{K}\Omega$	$T_C = 25^\circ\text{C}$	330	mJ
$E_{SCIS150}$	$I_{SCIS} = 11.4\text{A}$, $L = 3.0\text{mH}$, $R_{GE} = 1\text{K}\Omega$	$T_C = 150^\circ\text{C}$	195	mJ
I_{C25}	Collector Current Continuous, at $V_{GE} = 5.0\text{V}$, $T_C = 25^\circ\text{C}$	41	A	
I_{C110}	Collector Current Continuous, at $V_{GE} = 5.0\text{V}$, $T_C = 110^\circ\text{C}$	25	A	
V_{GEM}	Gate to Emitter Voltage Continuous	± 10	V	
P_D	Power Dissipation Total, at $T_C = 25^\circ\text{C}$	$T_C = 25^\circ\text{C}$	150	W
	Power Dissipation Derating, for $T_C > 25^\circ\text{C}$	$T_C > 25^\circ\text{C}$	1.0	W/ $^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to +175	$^\circ\text{C}$	
T_{STG}	Storage Junction Temperature Range	-55 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	
	CDM-Electrostatic Discharge Voltage at 1 Ω	2	kV	

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGD3325G2	FGD3325G2-F085	TO252	330mm	16mm	2500 units

Electrical Characteristics $T_A = 25^\circ\text{C}$ 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	$I_{CE} = 2\text{mA}$, $V_{GE} = 0$, $R_{GE} = 1\text{K}\Omega$, $T_J = -40$ to 150°C	225	-	275	V	
BV_{CES}	Collector to Emitter Breakdown Voltage	$I_{CE} = 10\text{mA}$, $V_{GE} = 0\text{V}$, $R_{GE} = 0$, $T_J = -40$ to 150°C	240	-	290	V	
BV_{ECS}	Emitter to Collector Breakdown Voltage	$I_{CE} = -75\text{mA}$, $V_{GE} = 0\text{V}$, $T_J = 25^\circ\text{C}$	28	-	-	V	
BV_{GES}	Gate to Emitter Breakdown Voltage	$I_{GES} = \pm 2\text{mA}$	± 12	± 14	-	V	
I_{CER}	Collector to Emitter Leakage Current	$V_{CE} = 175\text{V}$, $R_{GE} = 1\text{K}\Omega$	$T_J = 25^\circ\text{C}$	-	-	25	μA
			$T_J = 150^\circ\text{C}$	-	-	1	mA
I_{ECS}	Emitter to Collector Leakage Current	$V_{EC} = 24\text{V}$,	$T_J = 25^\circ\text{C}$	-	-	1	mA
			$T_J = 150^\circ\text{C}$	-	-	40	
R_1	Series Gate Resistance		-	120	-	Ω	
R_2	Gate to Emitter Resistance		10K	-	30K	Ω	

On State Characteristics

$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	$I_{CE} = 6\text{A}$, $V_{GE} = 4\text{V}$,	$T_J = 25^\circ\text{C}$	-	1.15	1.25	V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	$I_{CE} = 10\text{A}$, $V_{GE} = 4.5\text{V}$,	$T_J = 150^\circ\text{C}$	-	1.35	1.50	V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	$I_{CE} = 15\text{A}$, $V_{GE} = 4.5\text{V}$,	$T_J = 150^\circ\text{C}$	-	1.68	1.85	V

Electrical Characteristics $T_A = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
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Dynamic Characteristics

$Q_{G(ON)}$	Gate Charge	$I_{CE} = 10\text{A}, V_{CE} = 12\text{V}, V_{GE} = 5\text{V}$	-	21	-	nC
$V_{GE(TH)}$	Gate to Emitter Threshold Voltage	$I_{CE} = 1\text{mA}, V_{CE} = V_{GE},$	$T_J = 25^\circ\text{C}$ 1.3	1.5	2.2	V
			$T_J = 150^\circ\text{C}$ 0.75	1.1	1.8	
V_{GEP}	Gate to Emitter Plateau Voltage	$V_{CE} = 12\text{V}, I_{CE} = 10\text{A}$	-	2.7	-	V

Switching Characteristics

$t_{d(ON)R}$	Current Turn-On Delay Time-Resistive	$V_{CE} = 14\text{V}, R_L = 1\Omega$	-	0.8	4	μs
t_{rR}	Current Rise Time-Resistive	$V_{GE} = 5\text{V}, R_G = 1\text{K}\Omega$ $T_J = 25^\circ\text{C},$	-	1.2	7	μs
$t_{d(OFF)L}$	Current Turn-Off Delay Time-Inductive	$V_{CE} = 190\text{V}, L = 1\text{mH},$	-	5.1	15	μs
t_{fL}	Current Fall Time-Inductive	$V_{GE} = 5\text{V}, R_G = 1\text{K}\Omega$ $I_{CE} = 6.5\text{A}, T_J = 25^\circ\text{C},$	-	2.2	15	μs

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case		-	-	1	$^\circ\text{C/W}$
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Typical Performance Curves

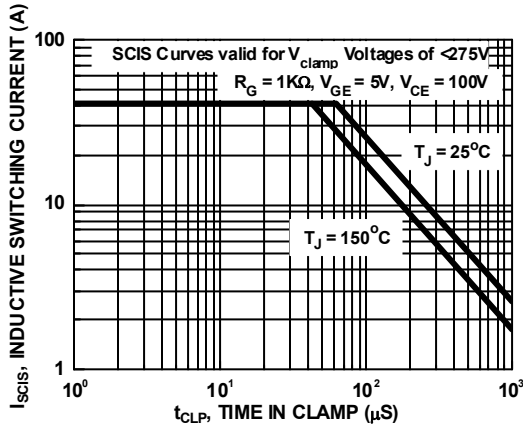


Figure 1. Self Clamped Inductive Switching Current vs. Time in Clamp

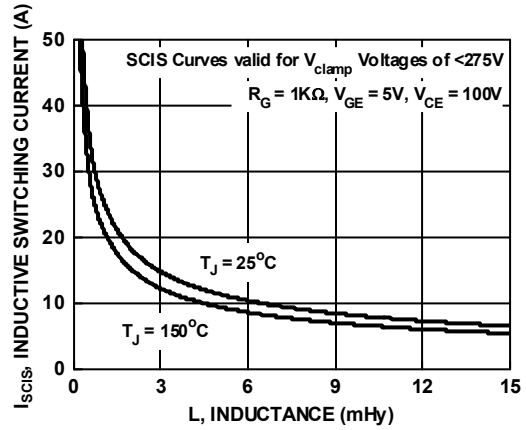


Figure 2. Self Clamped Inductive Switching Current vs. Inductance

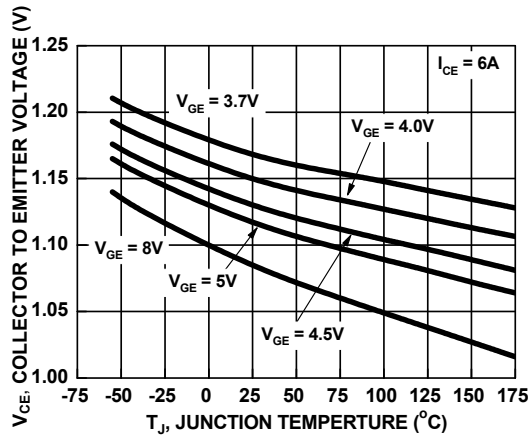


Figure 3. Collector to Emitter On-State Voltage vs. Junction Temperature

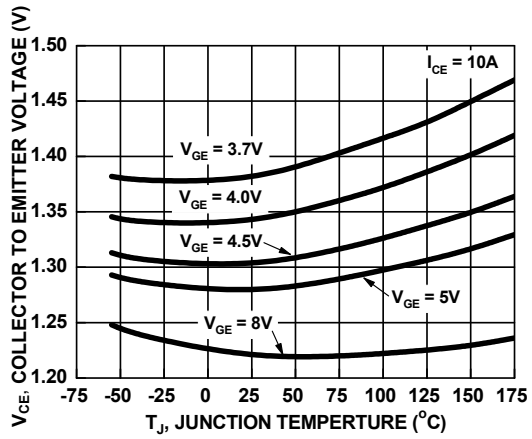


Figure 4. Collector to Emitter On-State Voltage vs. Junction Temperature

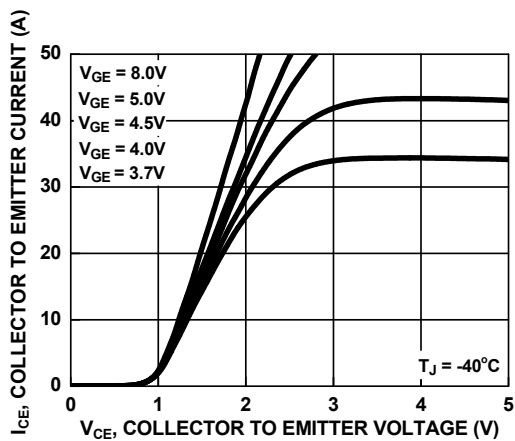


Figure 5. Collector to Emitter On-State Voltage vs. Collector Current

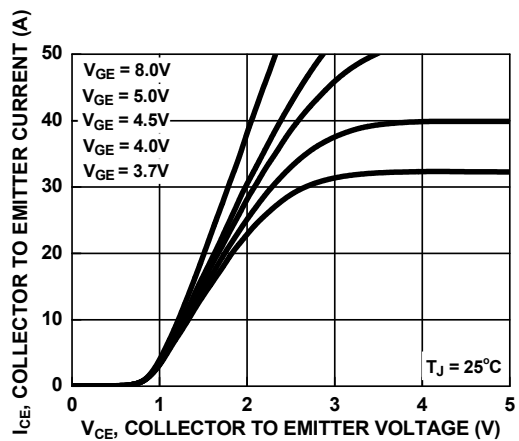


Figure 6. Collector to Emitter On-State Voltage vs. Collector Current

Typical Performance Curves (Continued)

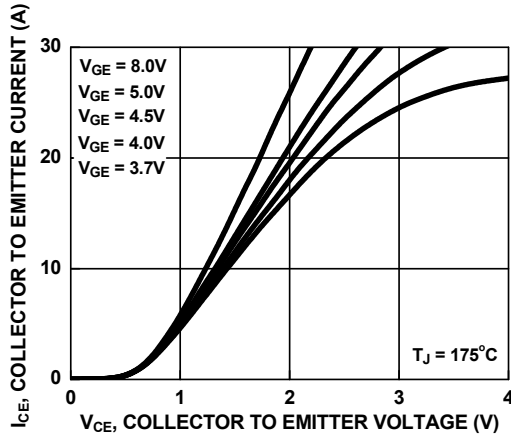


Figure 7. Collector to Emitter On-State Voltage vs. Collector Current

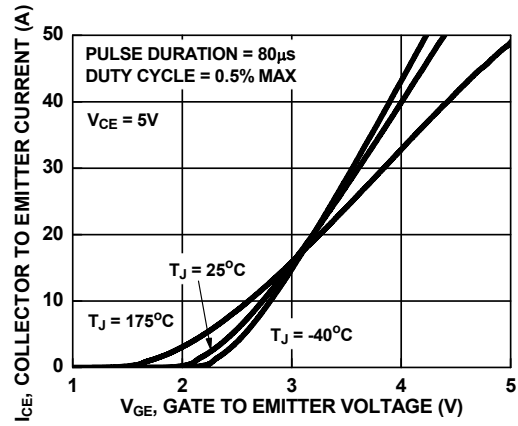


Figure 8. Transfer Characteristics

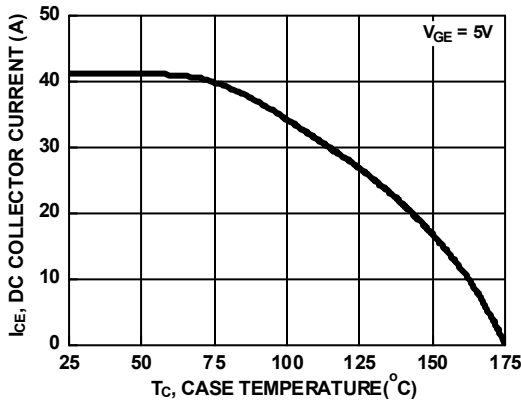


Figure 9. DC Collector Current vs. Case Temperature

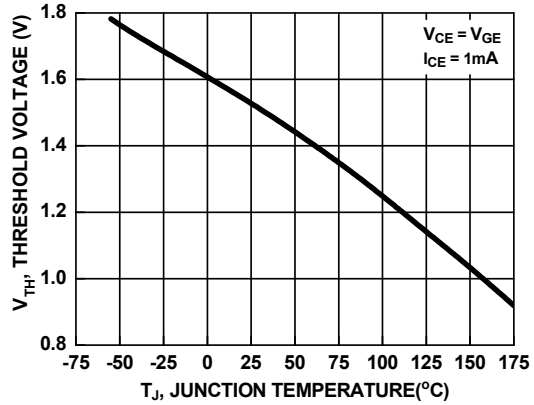


Figure 10. Threshold Voltage vs. Junction Temperature

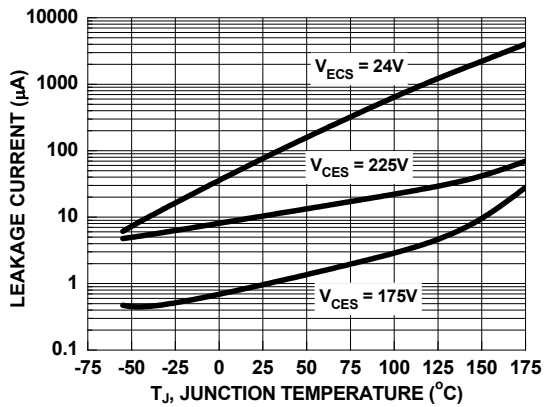


Figure 11. Leakage Current vs. Junction Temperature

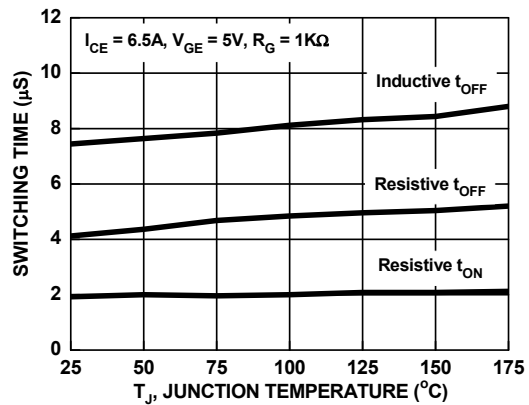


Figure 12. Switching Time vs. Junction Temperature

Typical Performance Curves (Continued)

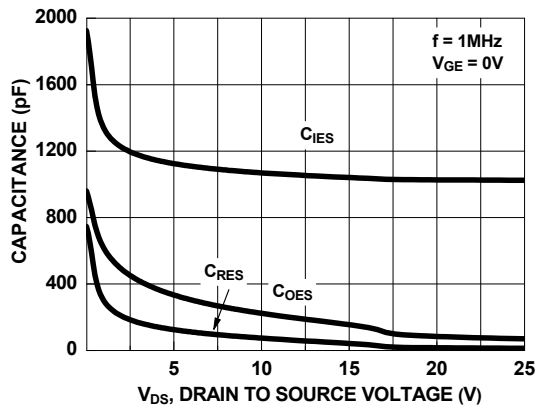


Figure 13. Capacitance vs. Collector to Emitter Voltage

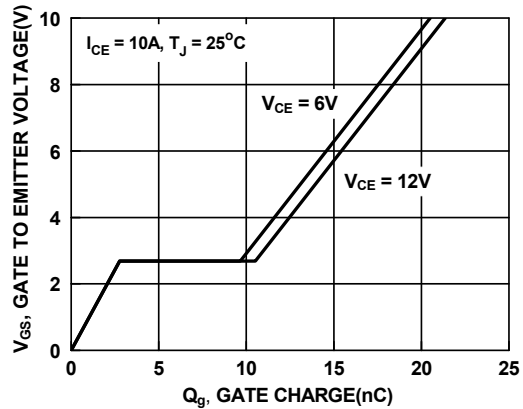


Figure 14. Gate Charge

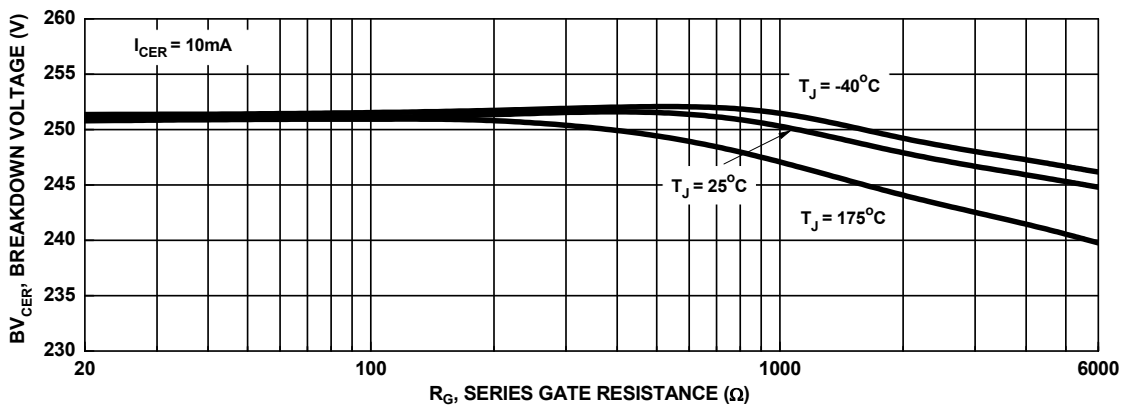


Figure 15. Break down Voltage vs. Series Gate Resistance

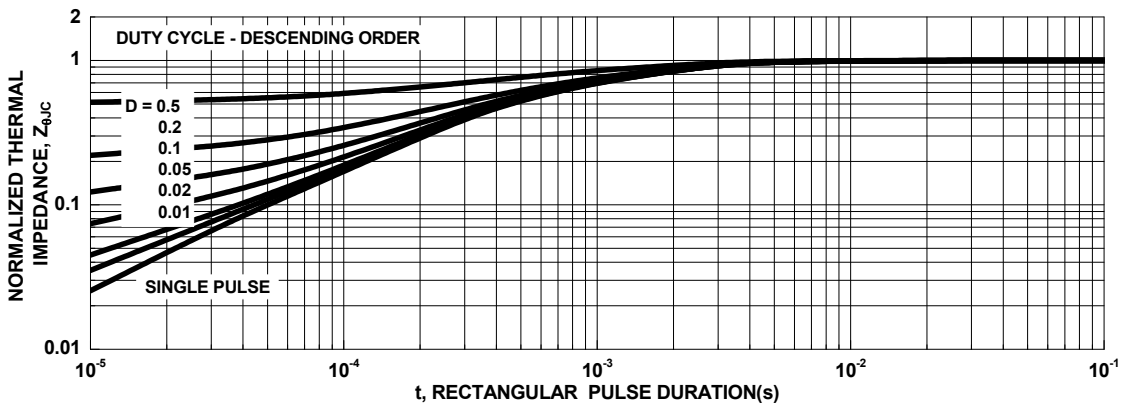
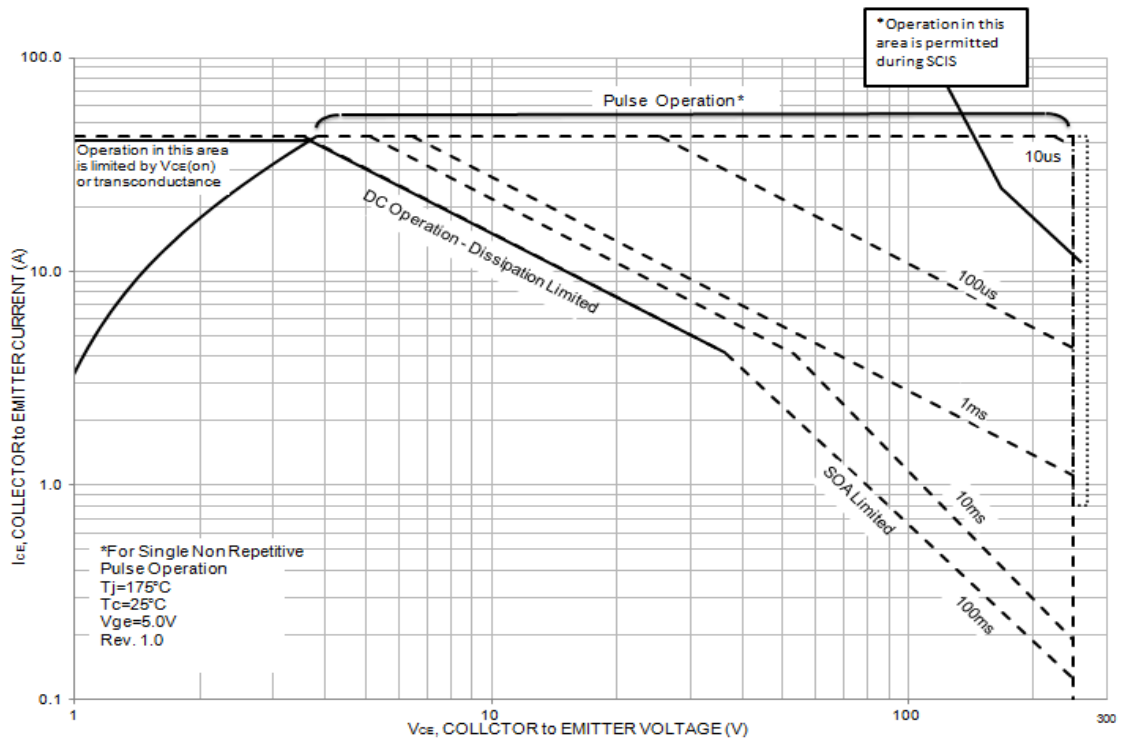


Figure 16. IGBT Normalized Transient Thermal Impedance, Junction to Case

Typical Performance Curves



Test Circuit and Waveforms

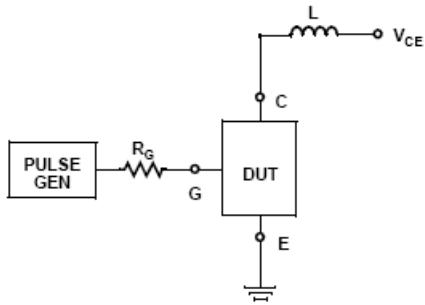


Figure 17. Inductive Switching Test Circuit

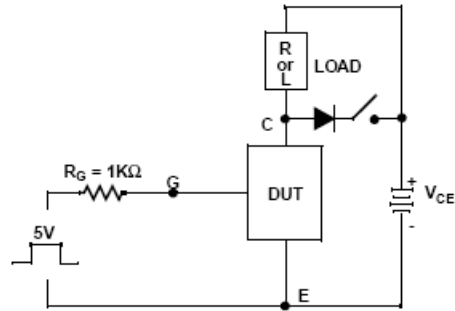


Figure 18. t_{ON} and t_{OFF} Switching Test Circuit

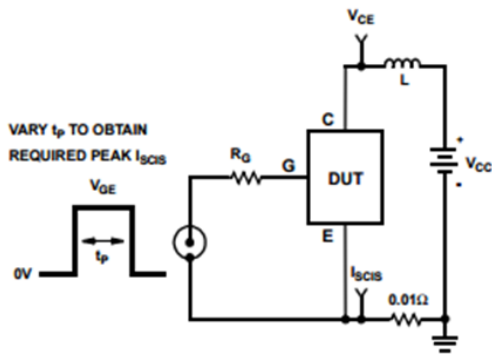


Figure 19. Energy Test Circuit

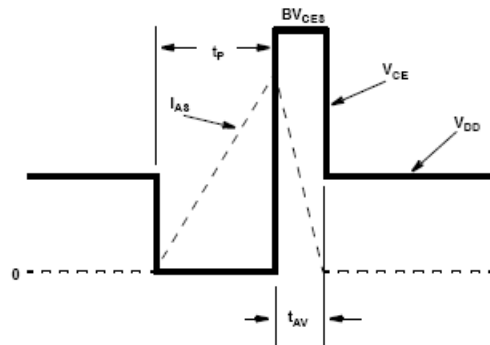
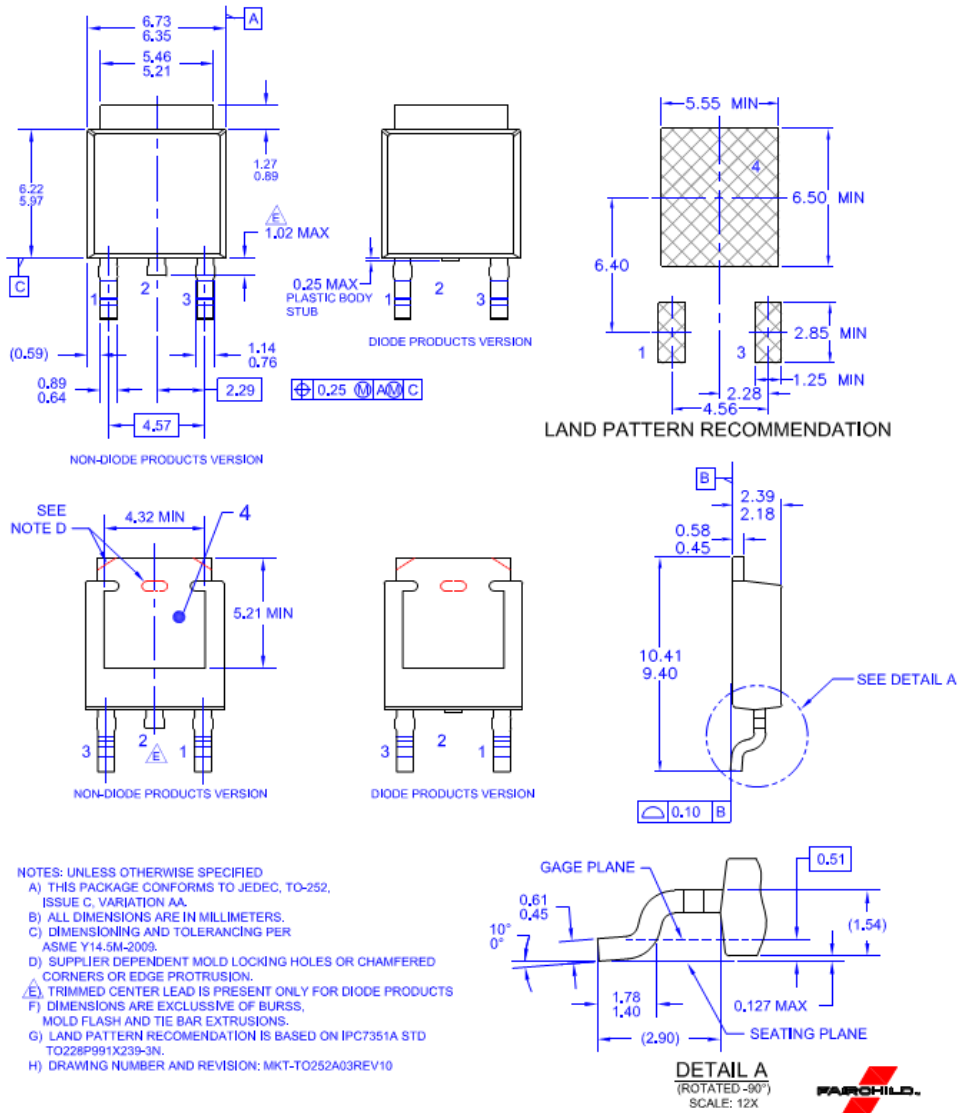


Figure 20. Energy Waveforms

Mechanical Dimensions

D-PAK



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