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ON Semiconductor®

FGD3325G2-F085

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

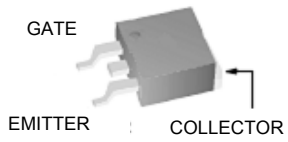
Features

- SCIS Energy = 330mJ at T_J = 25°C
- Logic Level Gate Drive
- Qualified to AEC Q101
- RoHS Compliant

Applications

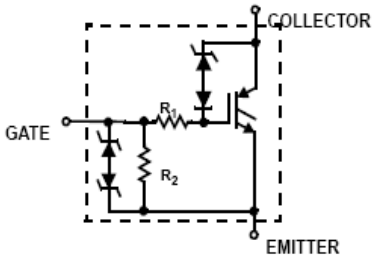
- Automotive Ignition Coil Driver Circuits
- Coil On Plug Applications

Package



JEDEC TO-252
D-Pak

Symbol



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

August-2017, Rev. 2

Publication Order Number:
FGD3325G2-F085/D

Absolute Maximum Ratings T_A = 25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
BV_{CER}	Collector to Emitter Breakdown Voltage (I_C = 1mA)		250	V
BV_{ECS}	Emitter to Collector Voltage - Reverse Battery Condition (I_C = 10mA)		28	V
E_{SCIS25}	I_{SCIS} = 14.8A, L = 3.0mHy, R_{GE} = 1KΩ	T_C = 25°C	330	mJ
$E_{SCIS150}$	I_{SCIS} = 11.4A, L = 3.0mHy, R_{GE} = 1KΩ	T_C = 150°C	195	mJ
I_{C25}	Collector Current Continuous, at V_{GE} = 5.0V, T_C = 25°C		41	A
I_{C110}	Collector Current Continuous, at V_{GE} = 5.0V, T_C = 110°C		25	A
V_{GEM}	Gate to Emitter Voltage Continuous		±10	V
P_D	Power Dissipation Total, at T_C = 25°C	T_C = 25°C	150	W
	Power Dissipation Derating, for T_C > 25°C	T_C > 25°C	1.0	W/°C
T_J	Operating Junction Temperature Range		-55 to +175	°C
T_{STG}	Storage Junction Temperature Range		-55 to +175	°C
T_L	Max. Lead Temp. for Soldering (Leads at 1.6mm from case for 10s)		300	°C
T_{PKG}	Reflow soldering according to JESD020C		260	°C
ESD	HBM-Electrostatic Discharge Voltage at100pF, 1500Ω		4	kV
	CDM-Electrostatic Discharge Voltage at 1Ω		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°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
Off State Characteristics							
BV_{CER}	Collector to Emitter Breakdown Voltage	I_{CE} = 2mA, V_{GE} = 0, R_{GE} = 1KΩ, T_J = -40 to 150°C		225	-	275	V
BV_{CES}	Collector to Emitter Breakdown Voltage	I_{CE} = 10mA, V_{GE} = 0V, R_{GE} = 0, T_J = -40 to 150°C		240	-	290	V
BV_{ECS}	Emitter to Collector Breakdown Voltage	I_{CE} = -75mA, V_{GE} = 0V, T_J = 25°C		28	-	-	V
BV_{GES}	Gate to Emitter Breakdown Voltage	I_{GES} = ±2mA		±12	±14	-	V
I_{CER}	Collector to Emitter Leakage Current	V_{CE} = 175V, R_{GE} = 1KΩ	T_J = 25°C	-	-	25	μA
			T_J = 150°C	-	-	1	mA
I_{ECS}	Emitter to Collector Leakage Current	V_{EC} = 24V,	T_J = 25°C	-	-	1	mA
			T_J = 150°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} = 6A, V_{GE} = 4V,	T_J = 25°C	-	1.15	1.25	V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_{CE} = 10A, V_{GE} = 4.5V,	T_J = 150°C	-	1.35	1.50	V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_{CE} = 15A, V_{GE} = 4.5V,	T_J = 150°C	-	1.68	1.85	V

Electrical Characteristics T_A = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
Dynamic Characteristics							
$Q_{G(ON)}$	Gate Charge	I_{CE} = 10A, V_{CE} = 12V, V_{GE} = 5V		-	21	-	nC
$V_{GE(TH)}$	Gate to Emitter Threshold Voltage	I_{CE} = 1mA, V_{CE} = V_{GE},	T_J = 25°C	1.3	1.5	2.2	V
			T_J = 150°C	0.75	1.1	1.8	
V_{GEP}	Gate to Emitter Plateau Voltage	V_{CE} = 12V, I_{CE} = 10A		-	2.7	-	V
Switching Characteristics							
$t_{d(ON)R}$	Current Turn-On Delay Time-Resistive	V_{CE} = 14V, R_L = 1Ω		-	0.8	4	μs
t_{rR}	Current Rise Time-Resistive	V_{GE} = 5V, R_G = 1KΩ T_J = 25°C,		-	1.2	7	μs
$t_{d(OFF)L}$	Current Turn-Off Delay Time-Inductive	V_{CE} = 190V, L = 1mH,		-	5.1	15	μs
t_{fL}	Current Fall Time-Inductive	V_{GE} = 5V, R_G = 1KΩ I_{CE} = 6.5A, T_J = 25°C,		-	2.2	15	μs
Thermal Characteristics							
$R_{\theta JC}$	Thermal Resistance Junction to Case			-	-	1	°C/W

Typical Performance Curves

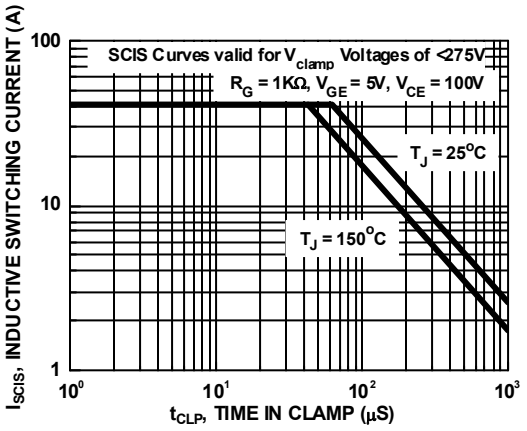


Figure 1. Self Clamped Inductive Switching Current vs. Time in Clamp

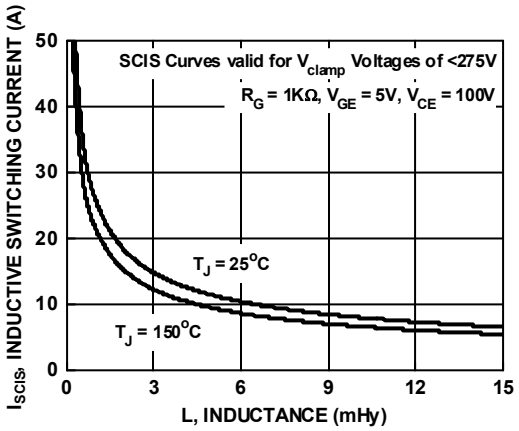


Figure 2. Self Clamped Inductive Switching Current vs. Inductance

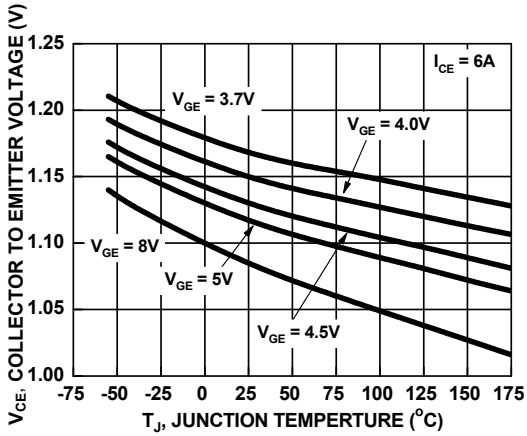


Figure 3. Collector to Emitter On-State Voltage vs. Junction Temperature

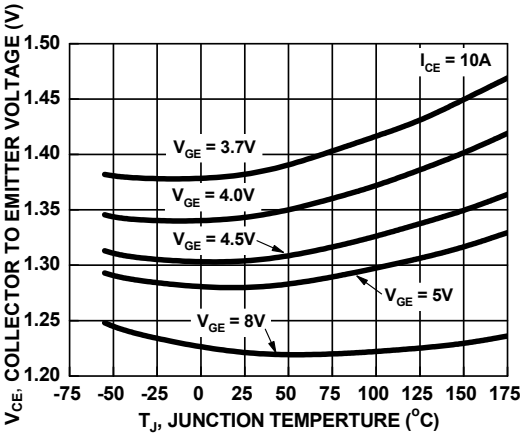


Figure 4. Collector to Emitter On-State Voltage vs. Junction Temperature

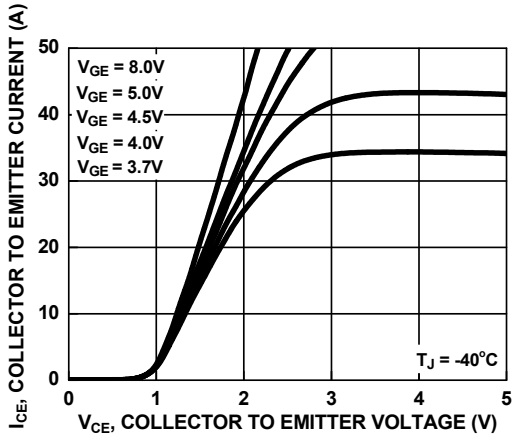


Figure 5. Collector to Emitter On-State Voltage vs. Collector Current

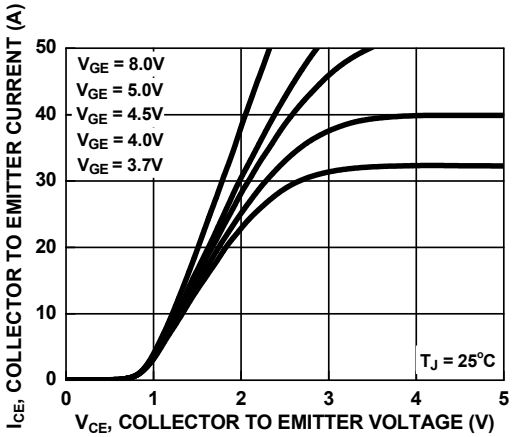


Figure 6. Collector to Emitter On-State Voltage vs. Collector Current

Typical Performance Curves (Continued)

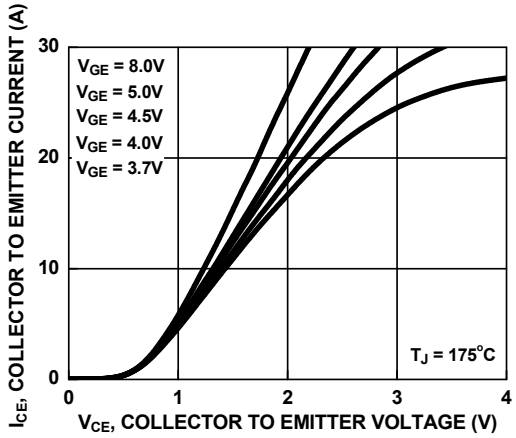


Figure 7. Collector to Emitter On-State Voltage vs. Collector Current

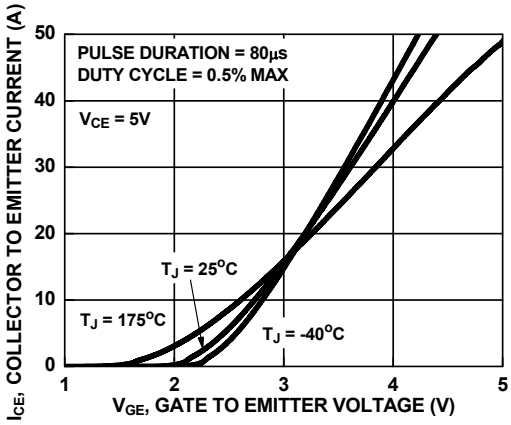


Figure 8. Transfer Characteristics

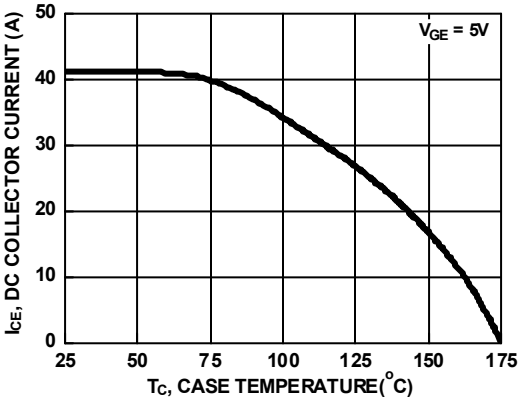


Figure 9. DC Collector Current vs. Case Temperature

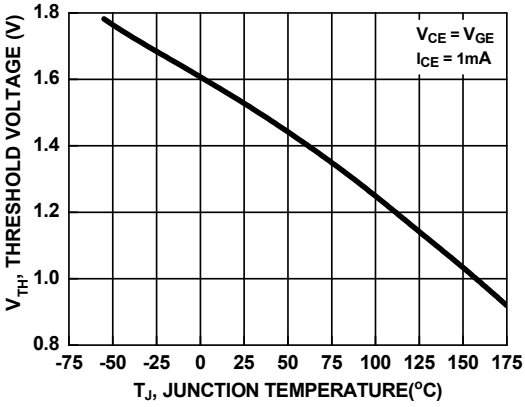


Figure 10. Threshold Voltage vs. Junction Temperature

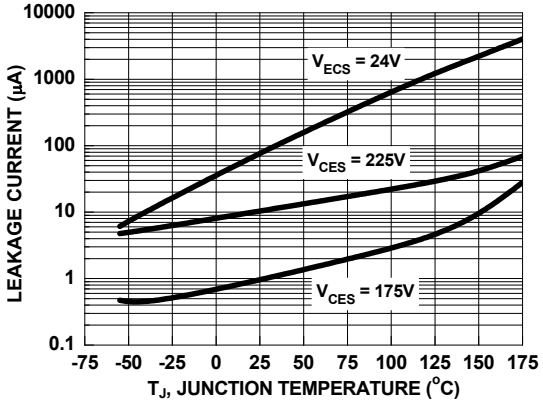


Figure 11. Leakage Current vs. Junction Temperature

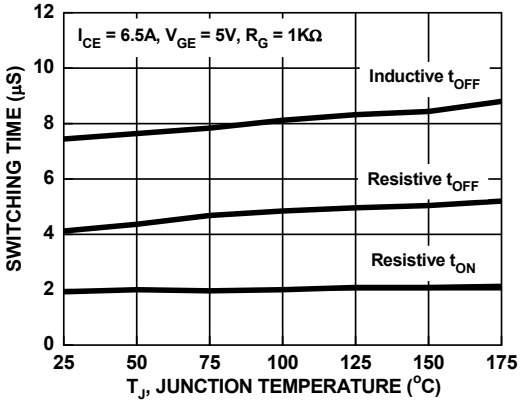


Figure 12. Switching Time vs. Junction Temperature

Typical Performance Curves (Continued)

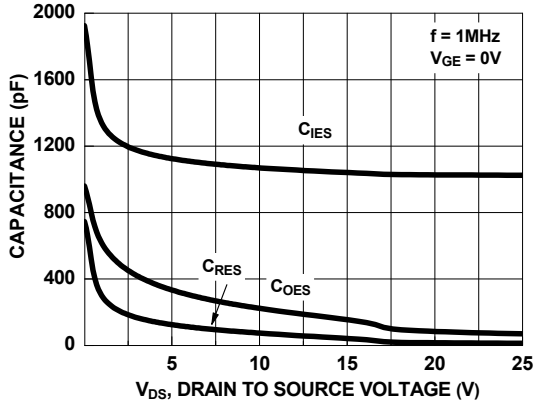


Figure 13. Capacitance vs. Collector to Emitter Voltage

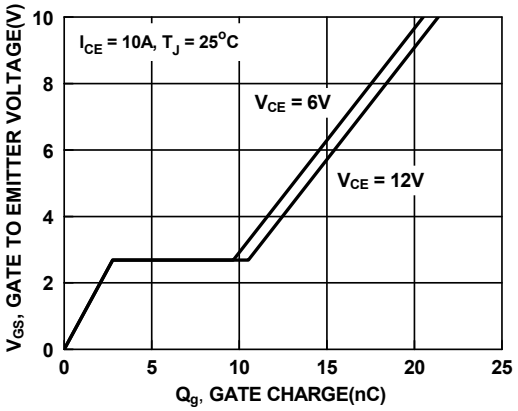


Figure 14. Gate Charge

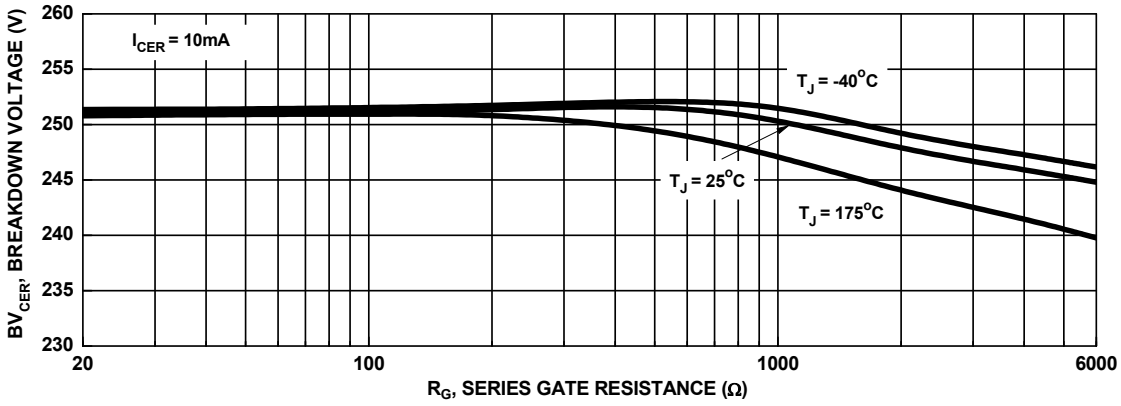


Figure 15. Break down Voltage vs. Series Gate Resistance

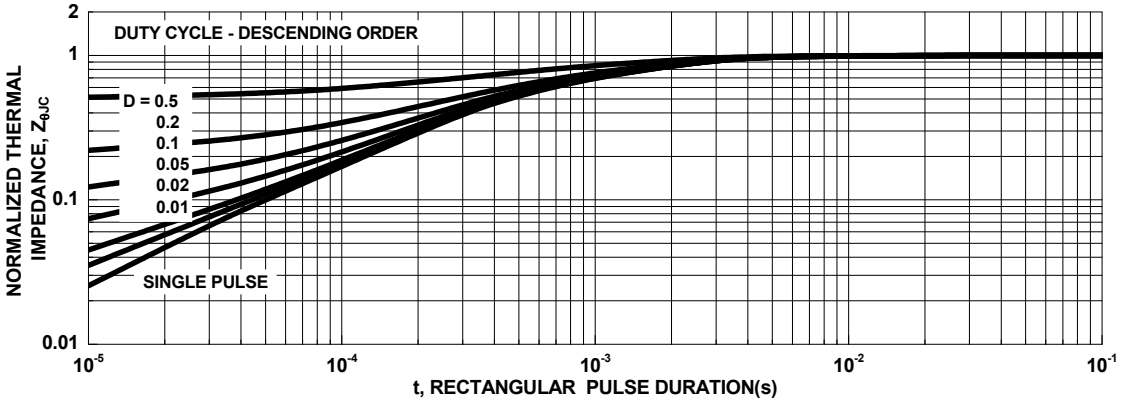


Figure 16. IGBT Normalized Transient Thermal Impedance, Junction to Case

Typical Performance Curves

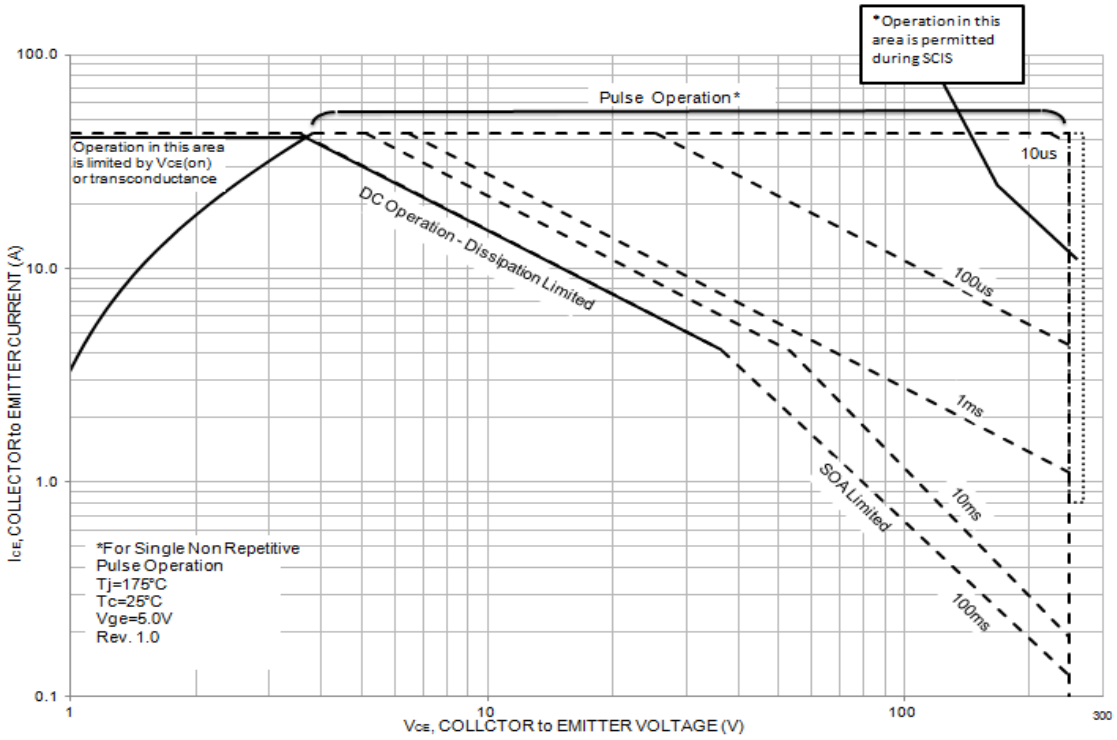


Figure 17. Forward Safe Operating Area

Test Circuit and Waveforms

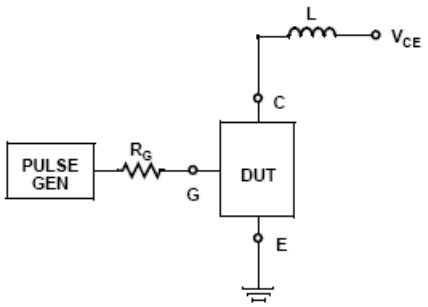


Figure 17. Inductive Switching Test Circuit

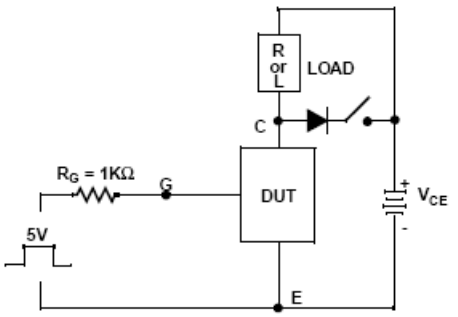


Figure 18. t_{ON} and t_{OFF} Switching Test Circuit

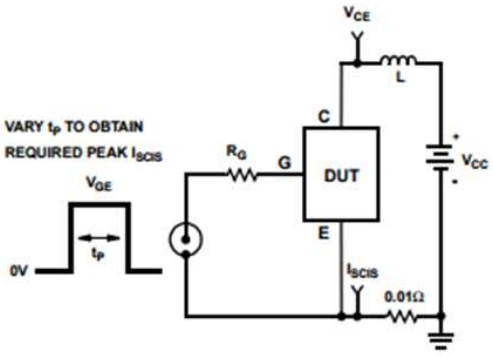


Figure 19. Energy Test Circuit

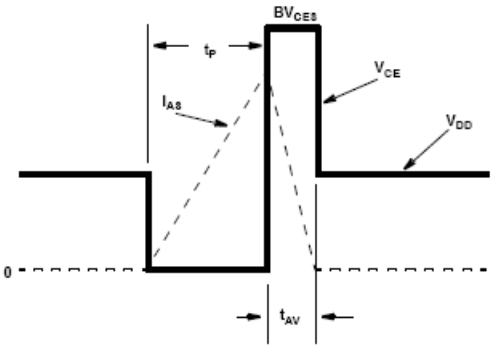
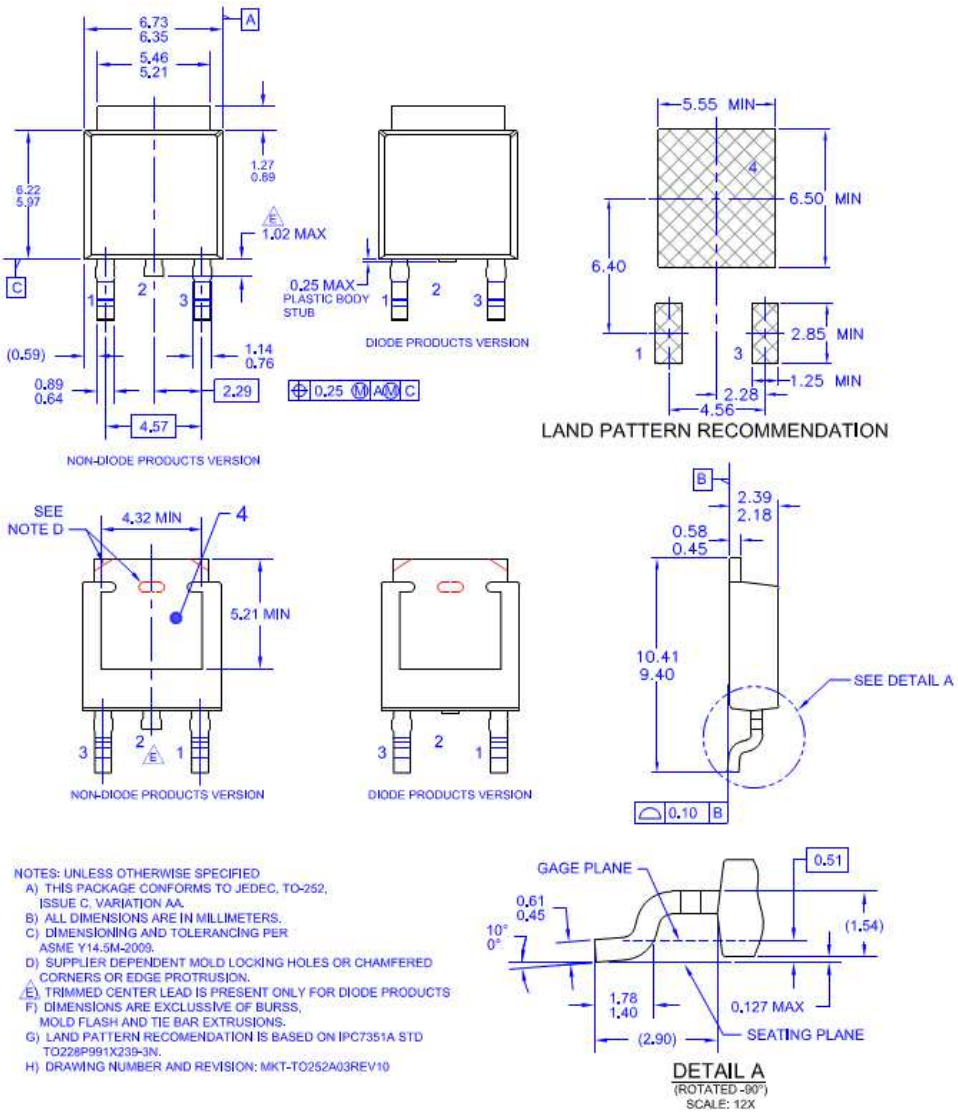


Figure 20. Energy Waveforms

Mechanical Dimensions

D-PAK



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