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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

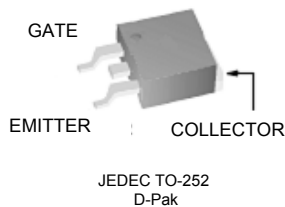## Applications

- Automotive Ignition Coil Driver Circuits
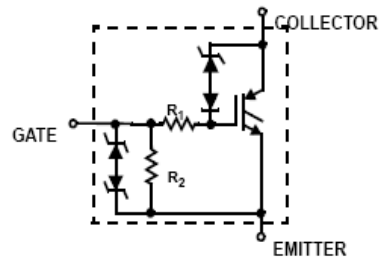- Coil On Plug Applications

100% RoHS COMPLIANT

Package

GATE

EMITTER   COLLECTOR

JEDEC TO-252
D-Pak

Symbol

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

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
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

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
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	$V_{CE} = 14V$, $R_L = 1\Omega$ $V_{GE} = 5V$, $R_G = 1K\Omega$ $T_J = 25°C$,		-	0.8	4	µs
t_{rR}	Current Rise Time-Resistive			-	1.2	7	µs
$t_{d(OFF)L}$	Current Turn-Off Delay Time-Inductive	$V_{CE} = 190V$, $L = 1mH$, $V_{GE} = 5V$, $R_G = 1K\Omega$ $I_{CE} = 6.5A$, $T_J = 25°C$,		-	5.1	15	µs
t_{fL}	Current Fall Time-Inductive			-	2.2	15	µs
Thermal Characteristics							
$R_{\theta JC}$	Thermal Resistance Junction to Case			-	-	1	°C/W

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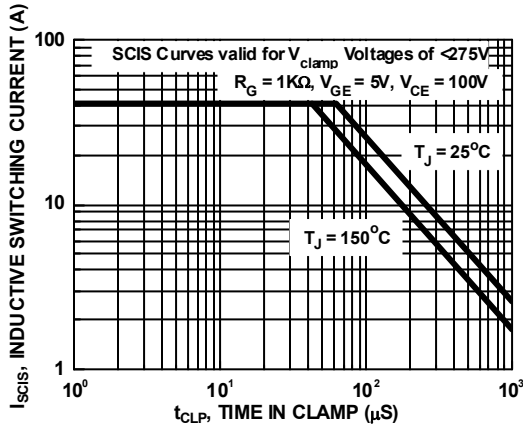
Figure 1. Self Clamped Inductive Switching Current vs. Time in Clamp
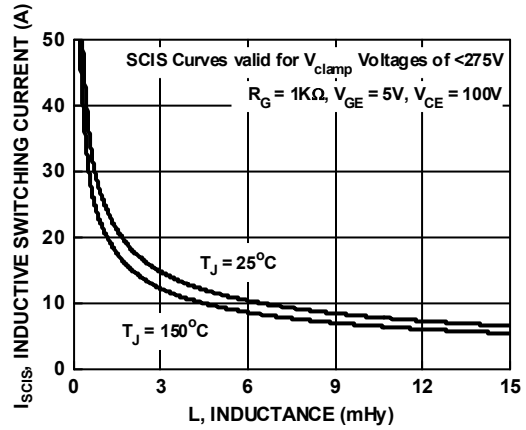

Figure 2. Self Clamped Inductive Switching Current vs. Inductance
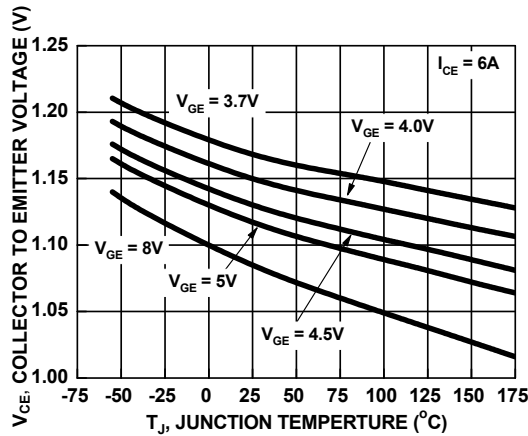

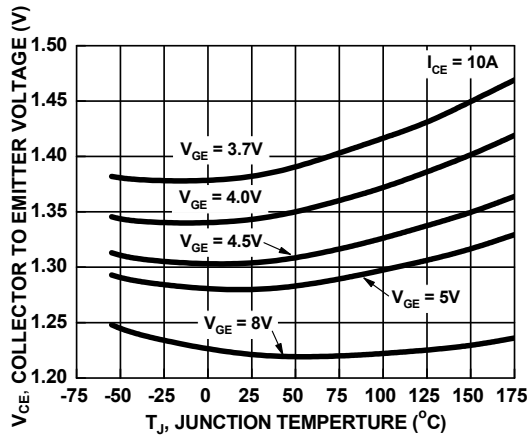Figure 3. Collector to Emitter On-State Voltage vs. Junction Temperature

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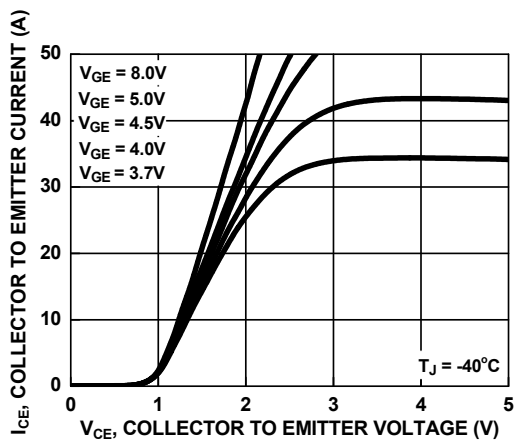

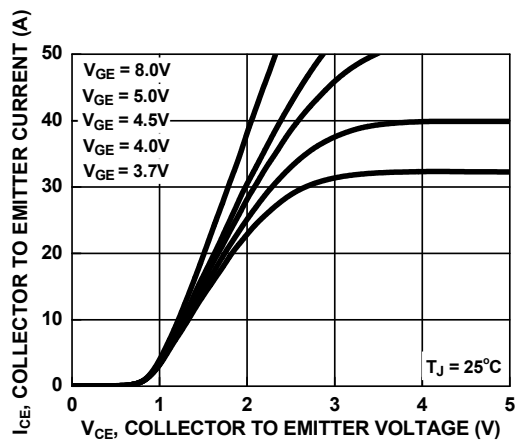Figure 5. Collector to Emitter On-State Voltage vs. Collector Current

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

Typical Performance Curves   (Continued)
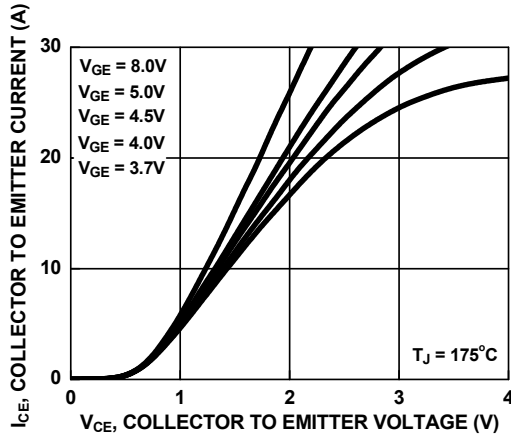
Figure 7. Collector to Emitter On-State Voltage vs. Collector Current
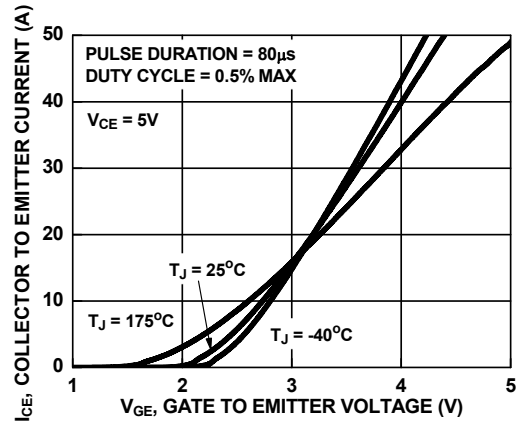
Figure 8. Transfer Characteristics
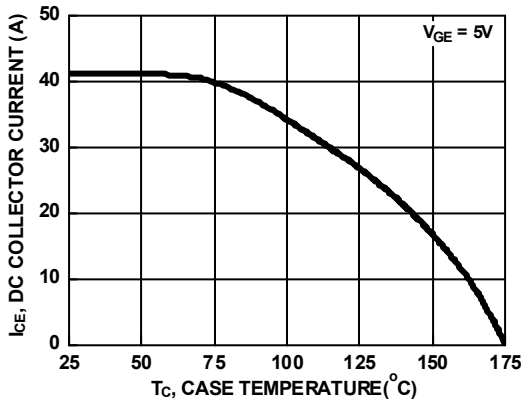
Figure 9. DC Collector Current vs. Case Temperature
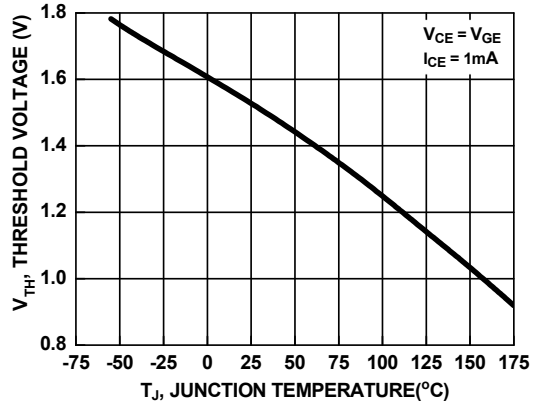
Figure 10. Threshold Voltage vs. Junction Temperature
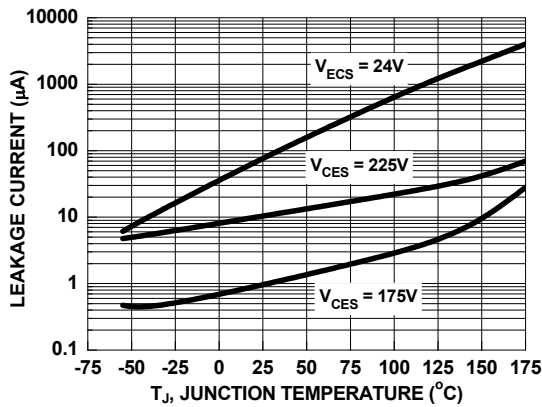
Figure 11. Leakage Current vs. Junction Temperature
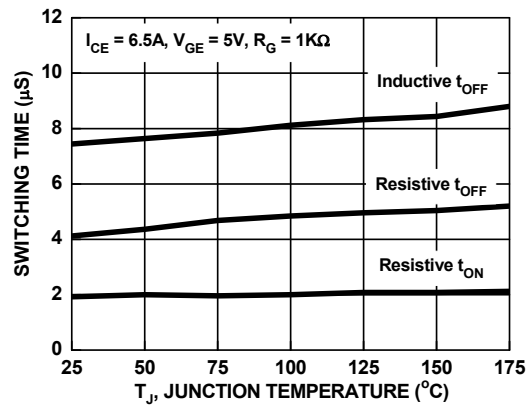
Figure 12. Switching Time vs. Junction Temperature

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

Figure 13. Capacitance vs. Collector to Emitter Voltage
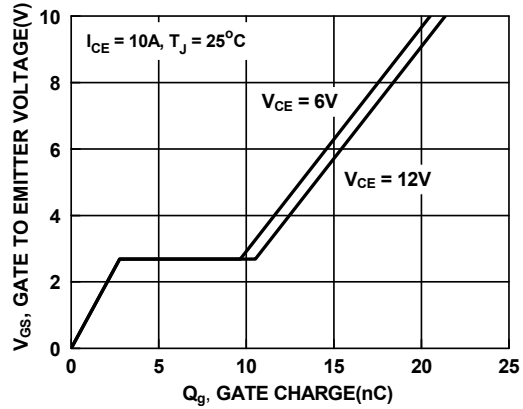
Figure 14. Gate Charge
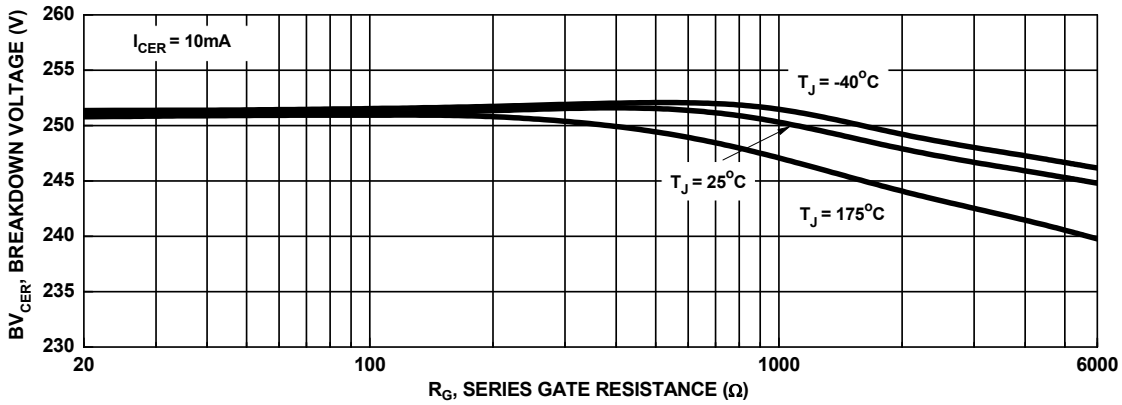
Figure 15. Break down Voltage vs. Series Gate Resistance
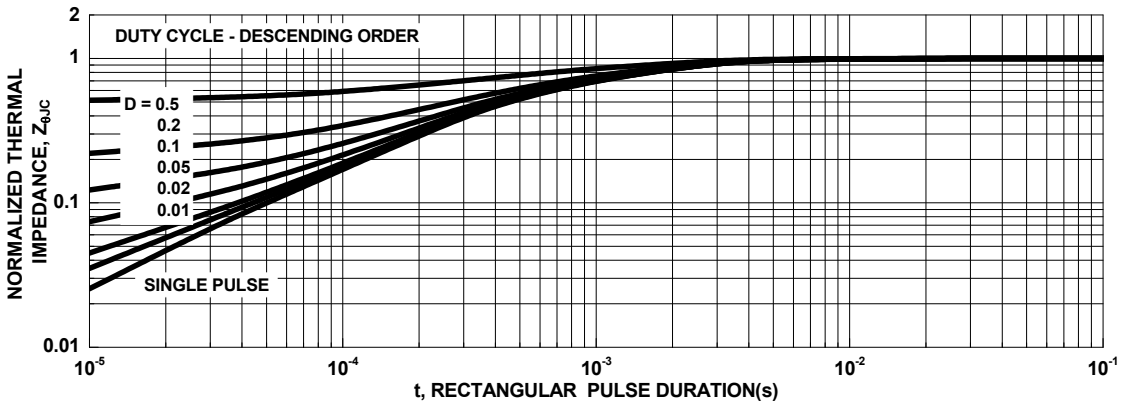
Figure 16. IGBT Normalized Transient Thermal Impedance, Junction to Case
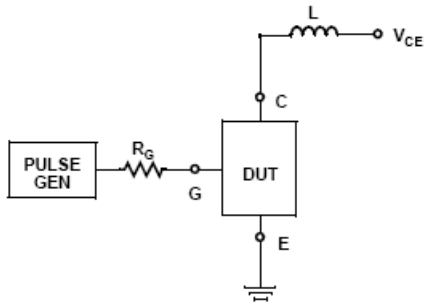
Typical Performance Curves

Figure 17. Forward Safe Operating Area
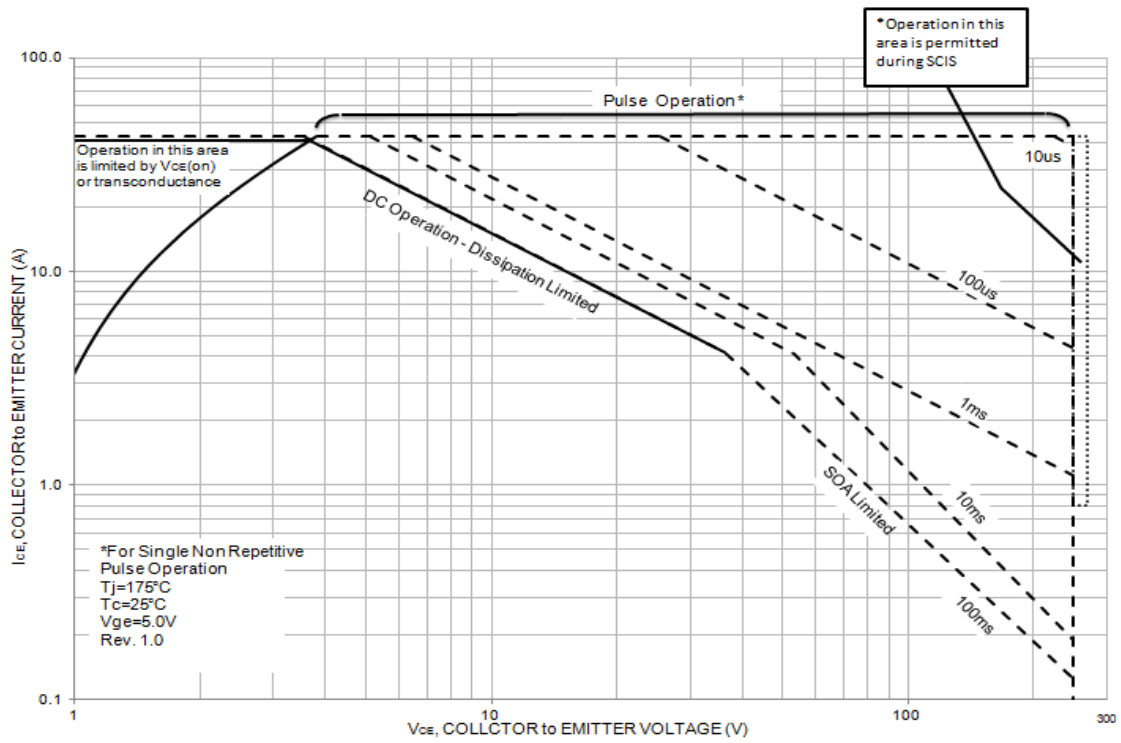
Test Circuit and Waveforms

Figure 17. Inductive Switching Test Circuit
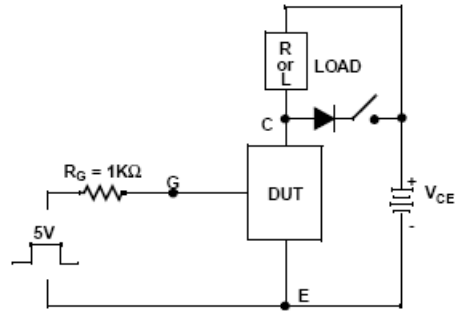
Figure 18. t_{ON} and t_{OFF} Switching Test Circuit
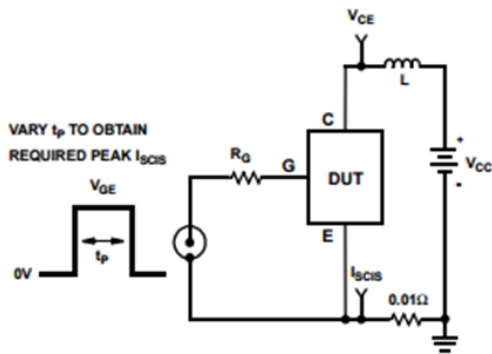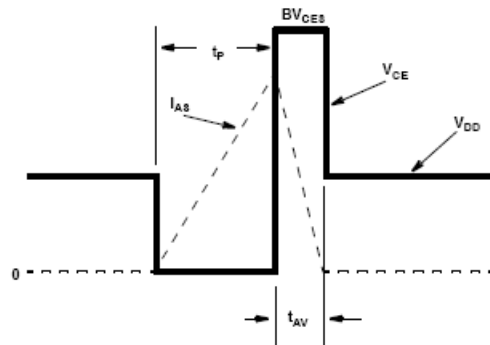

Figure 19. Energy Test Circuit

Figure 20. Energy Waveforms

Mechanical Dimensions

D-PAK

NON-DIODE PRODUCTS VERSION

DIODE PRODUCTS VERSION

LAND PATTERN RECOMMENDATION

SEE DETAIL A

SEE DETAIL A

NOTES: UNLESS OTHERWISE SPECIFIED
A) THIS PACKAGE CONFORMS TO JEDEC, TO-252,
    ISSUE C, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONING AND TOLERANCING PER
    ASME Y14.5M-2009.
D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED
    CORNERS OR EDGE PROTRUSION.
E) TRIMMED CENTER LEAD IS PRESENT ONLY FOR DIODE PRODUCTS
F) DIMENSIONS ARE EXCLUSSIVE OF BURSS,
    MOLD FLASH AND TIE BAR EXTRUSIONS.
G) LAND PATTERN RECOMENDATION IS BASED ON IPC7351A STD
    TO228P991X239-3N.
H) DRAWING NUMBER AND REVISION: MKT-TO252A03REV10

DETAIL A
(ROTATED -90°)
SCALE: 12X

GAGE PLANE

SEATING PLANE

Package drawings are provided as a service to customers considering ON Semiconductor components. Drawings may change in any manner without notice. Please note the revision and/or date on the drawing and contact a ON Semiconductor representative to verify or obtain the most recent revision. Package specifications do not expand the terms of ON Semiconductor's worldwide terms and conditions, specifically the warranty therein, which covers ON Semiconductor products.

PUBLICATION ORDERING INFORMATION

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