ECOSPARK® II, Ignition IGBT

300 mJ, 500 V, N−Channel Ignition IGBT

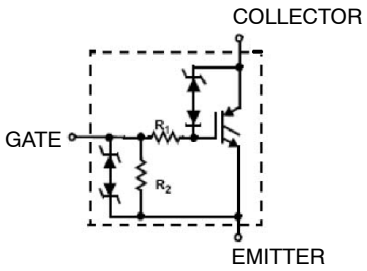
FGD3050G2

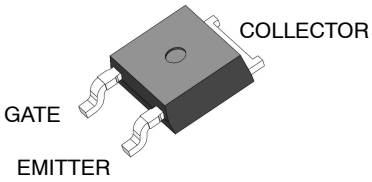
Features

- SCIS Energy = 300 mJ at T_J = 25°C
- Logic Level Gate Drive
- AEC−Q101 Qualified and PPAP Capable
- This Device is Pb−Free, Halid Free and is RoHS Compliant

Applications

- Automotive Ignition Coil Driver Circuits
- Coil on Plug Application





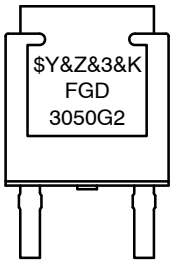
DPAK3 (TO−252 3 LD)
CASE 369AS

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

Symbol	Parameter	Value	Unit
BV_{CER}	Collector to Emitter Breakdown Voltage (I_C = 1 mA)	500	V
BV_{ECS}	Emitter to Collector Voltage − Reverse Battery Condition (I_C = 10 mA)	20	V
E_{SCIS25}	I_{SCIS} = 14.2 A, L = 3.0 mHy, R_{GE} = 1 kΩ T_C = 25°C	300	mJ
$E_{SCIS150}$	I_{SCIS} = 11.0 A, L = 3.0 mHy, R_{GE} = 1 kΩ T_C = 150°C	180	mJ
I_{C25}	Collector Current Continuous at V_{GE} = 5.0 V, T_C = 25°C	32	A
I_{C110}	Collector Current Continuous at V_{GE} = 5.0 V, T_C = 110°C	27	A
V_{GEM}	Gate to Emitter Voltage Continuous	±10	V
P_D	Power Dissipation Total, T_C = 25°C	150	W
	Power Dissipation Derating, T_C > 25°C	1.1	W/°C
T_J	Operating Junction Temperature Range	−40 to +175	°C
T_{STG}	Storage Junction Temperature Range	−40 to +175	°C
T_L	Max. Lead Temperature for Soldering (Leads at 1.6 mm from case for 10 s)	300	°C
T_{PKG}	Max. Lead Temperature for Soldering (Package Body for 10 s)	260	°C
ESD	Electrostatic Discharge Voltage at 100 pF, 1500 Ω	4	kV

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

MARKING DIAGRAM



$Y = **onsemi** Logo
&Z = Assembly Plant Code
&3 = 3−Digit Date Code
&K = 2−Digits Lot Run Traceability Code
FGD3050G2 = Specific Device Code

ORDERING INFORMATION

See detailed ordering and shipping information on page 6 of this data sheet.

THERMAL CHARACTERISTICS

Symbol	Characteristic	Max	Units
$R_{\theta JC}$	Thermal Resistance Junction to Case	0.9	°C/W

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

Symbol	Parameter	Test Conditions		Min	Typ.	Max.	Units
OFF CHARACTERISTICS							
BV_{CER}	Collector to Emitter Breakdown Voltage	I_{CE} = 2 mA, V_{GE} = 0 V, R_{GE} = 1 kΩ, T_J = −40 to 150°C		470	–	530	V
BV_{CES}	Collector to Emitter Breakdown Voltage	I_{CE} = 10 mA, V_{GE} = 0 V, R_{GE} = 0 Ω, T_J = −40 to 150°C		495	–	555	V
BV_{ECS}	Emitter to Collector Breakdown Voltage	I_{CE} = −75 mA, V_{GE} = 0 V, T_J = 25°C		20	–	–	V
BV_{GES}	Gate to Emitter Breakdown Voltage	I_{GES} = ±5 mA		±12	±14	–	V
I_{CER}	Collector to Emitter Leakage Current	V_{CE} = 250 V, R_{GE} = 1 kΩ	T_J = 25°C	–	–	25	μA
			T_J = 150°C	–	–	1	mA
I_{ECS}	Emitter to Collector Leakage Current	V_{EC} = 15 V	T_J = 25°C	–	–	1	mA
			T_J = 150°C	–	–	40	
R_1	Series Gate Resistance			–	111	–	Ω
R_2	Gate to Emitter Resistance			10	–	30	kΩ
ON CHARACTERISTICS							
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_{CE} = 6 A, V_{GE} = 4 V, T_J = 25°C		–	1.1	1.2	V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_{CE} = 10 A, V_{GE} = 4.5 V, T_J = 150°C		–	1.3	1.45	V
$V_{CE(SAT)}$	Collector to Emitter Saturation Voltage	I_{CE} = 15 A, V_{GE} = 4.5 V, T_J = 150°C		–	1.6	1.75	V
DYNAMIC CHARACTERISTICS							
$Q_{G(ON)}$	Gate Charge	I_{CE} = 10 A, V_{CE} = 12 V, V_{GE} = 5 V		–	22	–	nC
$V_{GE(TH)}$	Gate to Emitter Threshold Voltage	I_{CE} = 1 mA, V_{CE} = V_{GE}	T_J = 25°C	1.3	1.6	2.2	V
			T_J = 150°C	0.75	1.1	1.8	
V_{GEP}	Gate to Emitter Plateau Voltage	V_{CE} = 12 V, I_{CE} = 10 A		–	2.7	–	V
SWITCHING CHARACTERISTICS							
$t_{d(ON)R}$	Current Turn−On Delay Time−Resistive	V_{CE} = 14 V, R_L = 1 Ω, V_{GE} = 5 V, R_G = 1 kΩ,		–	0.9	4	μs
t_{rR}	Current Rise Time−Resistive			–	1.6	7	μs
$t_{d(OFF)L}$	Current Turn−Off Delay Time−Inductive	V_{CE} = 300 V, L = 2 mH, V_{GE} = 5 V, R_G = 1 kΩ,		–	5.4	15	μs
t_{fL}	Current Fall Time−Inductive			–	1.4	15	μs

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL CHARACTERISTICS

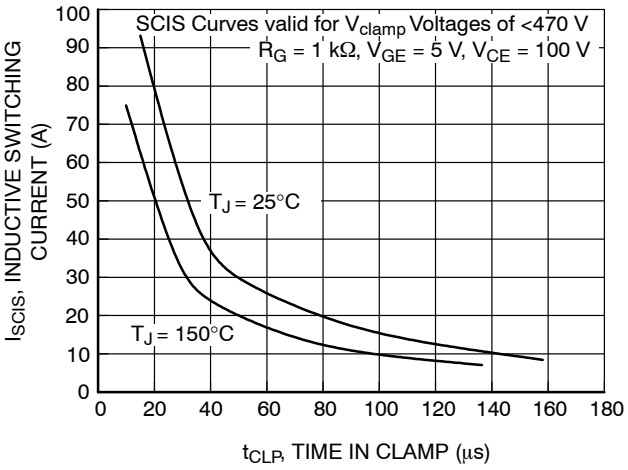


Figure 1. Self Clamped Inductive Switching Current vs. Time in Clamp

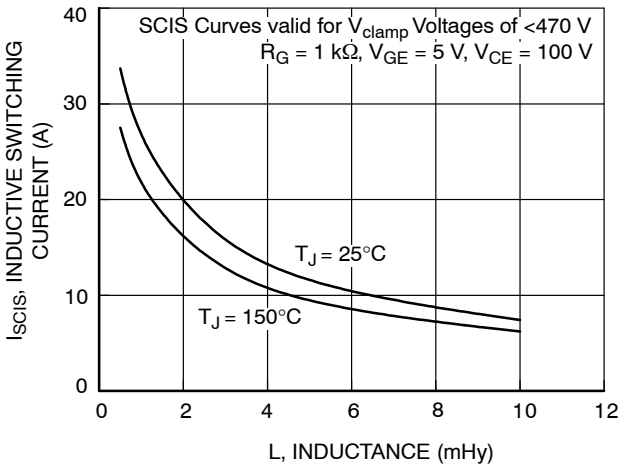


Figure 2. Self Clamped Inductive Switching Current vs. Inductance

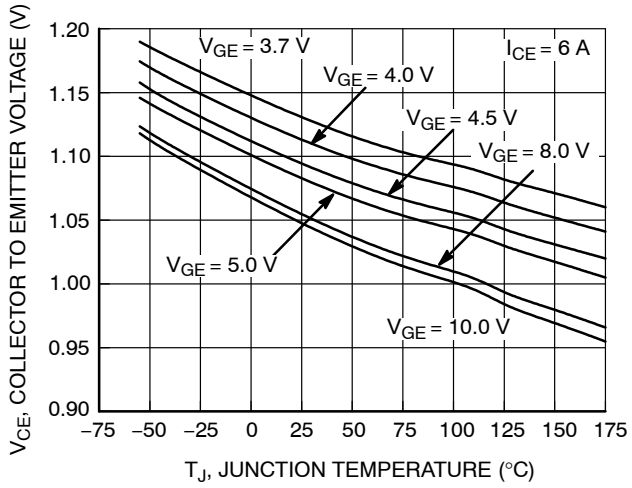


Figure 3. Collector to Emitter On−State Voltage vs. Junction Temperature

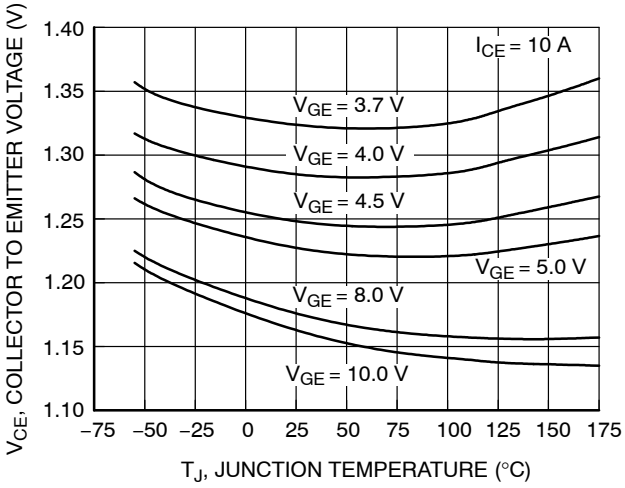


Figure 4. Collector to Emitter On−State Voltage vs. Junction Temperature

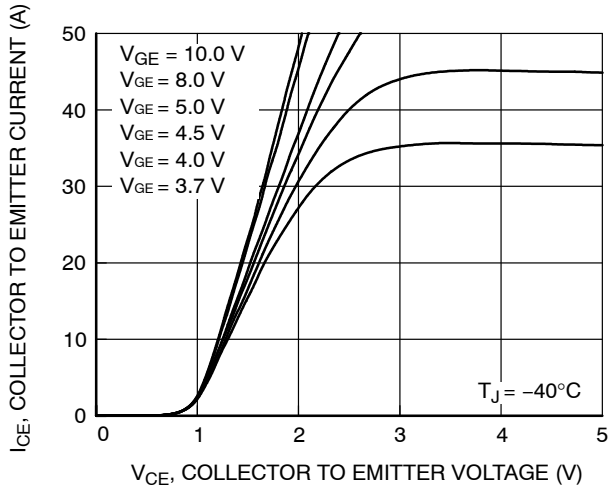


Figure 5. Collector to Emitter On−State Voltage vs. Collector Current

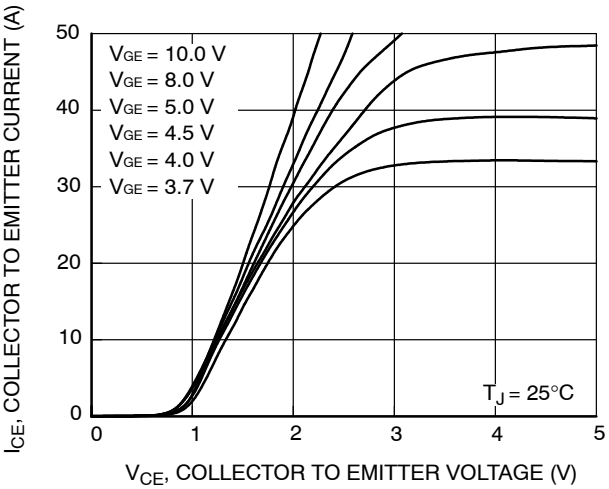


Figure 6. Collector to Emitter On−State Voltage vs. Collector Current

TYPICAL CHARACTERISTICS (continued)

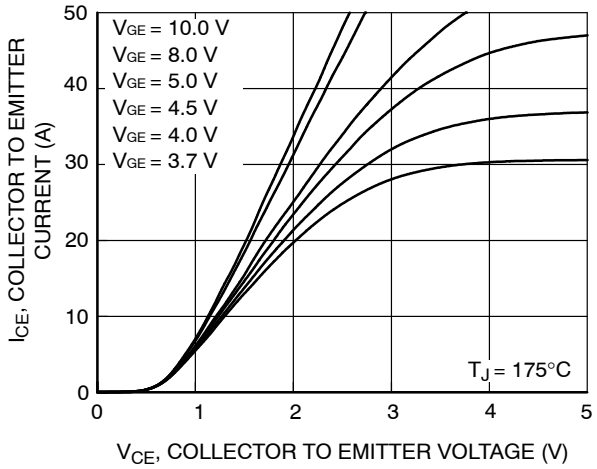


Figure 7. Collector to Emitter On−State Voltage vs. Collector Current

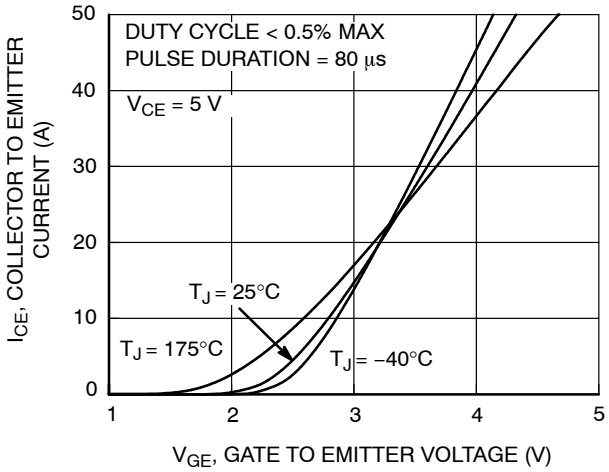


Figure 8. Transfer Characteristics

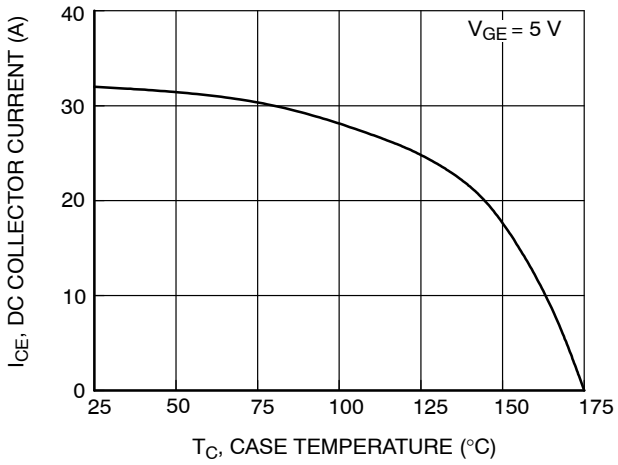


Figure 9. DC Collector Current vs. Case Temperature

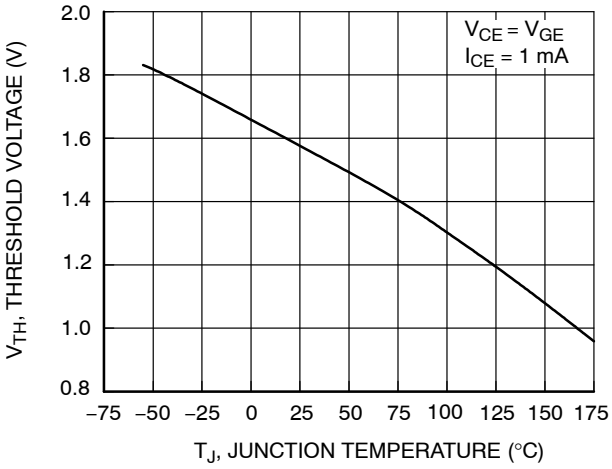


Figure 10. Threshold Voltage vs. Junction Temperature

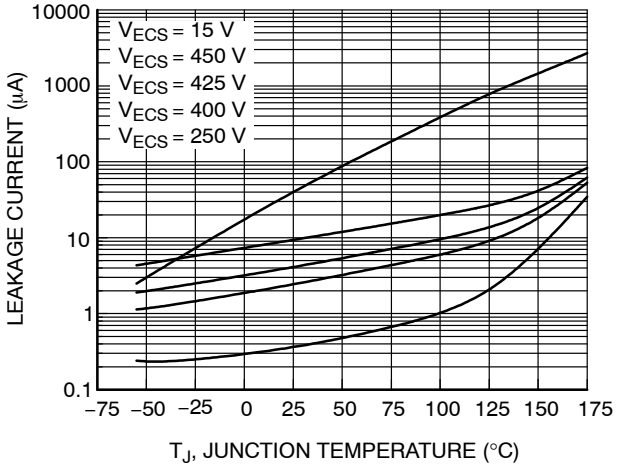


Figure 11. Leakage Current vs. Junction Temperature

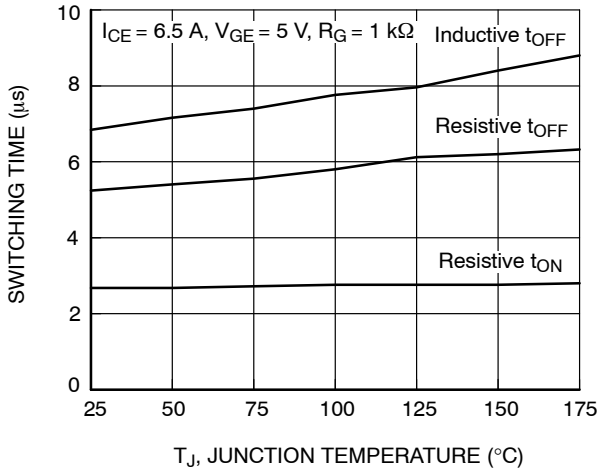


Figure 12. Switching Time vs. Junction Temperature

TYPICAL CHARACTERISTICS (continued)

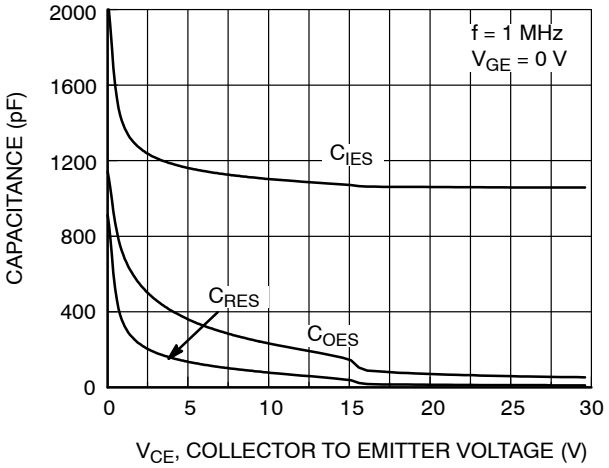


Figure 13. Capacitance vs. Collector to Emitter Voltage

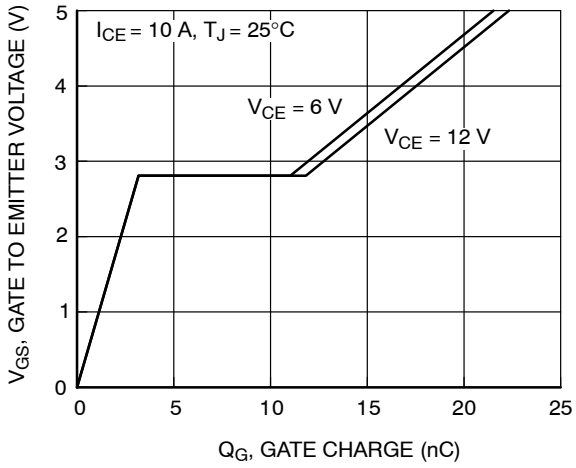


Figure 14. Gate Charge

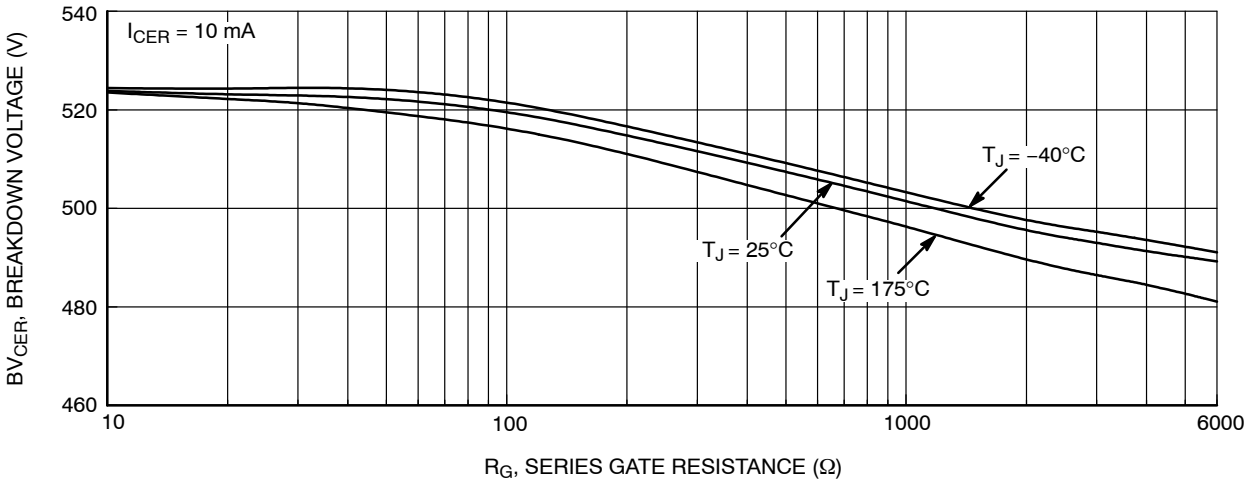


Figure 15. Breakdown Voltage vs. Series Gate Resistance

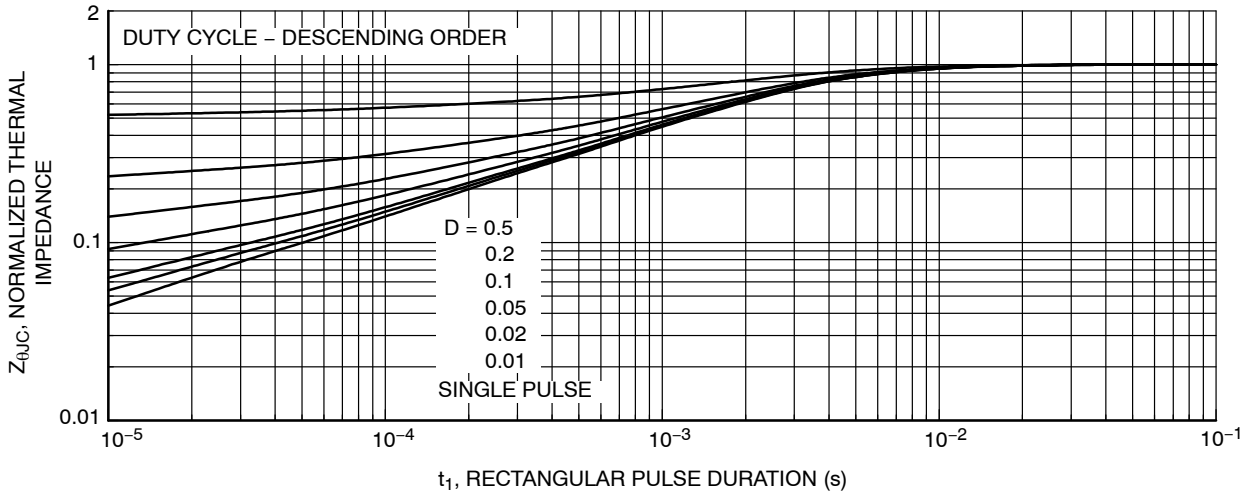
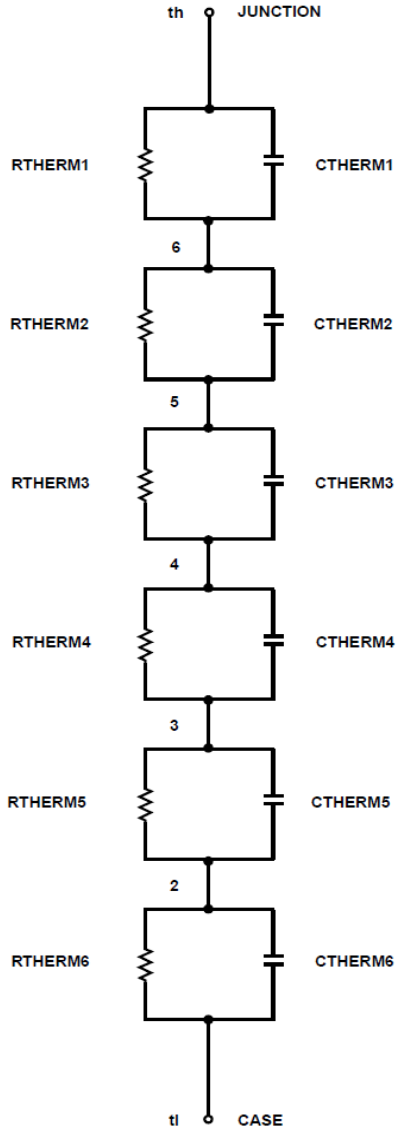


Figure 16. IGBT Normalized Transient Thermal Impedance, Junction to Case

SPICE THERMAL MODEL

```
CTHERM1 th 6 5.7337E-05
CTHERM2 6 5 5.3736E-03
CTHERM3 5 4 1.1141E-03
CTHERM4 4 3 2.8690E-04
CTHERM5 3 2 7.4429E-04
CTHERM6 2 tl 3.7019E-03

RTHERM1 th 6 6.6403E-03
RTHERM2 6 5 5.8449E-01
RTHERM3 5 4 5.3930E-02
RTHERM4 4 3 9.2492E-03
RTHERM5 3 2 1.5794E-02
RTHERM6 2 tl 1.7974E-01
```

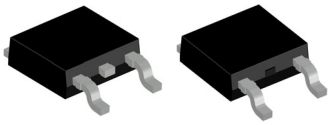


PACKAGE MARKING AND ORDERING INFORMATION

Device	Device Marking	Package	Shipping†
FGD3050G2	FGD3050G2	DPAK3 (TO−252 3 LD) (Pb−Free)	2500 / Tape & Reel

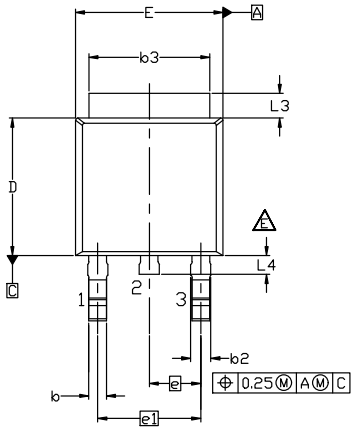
†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

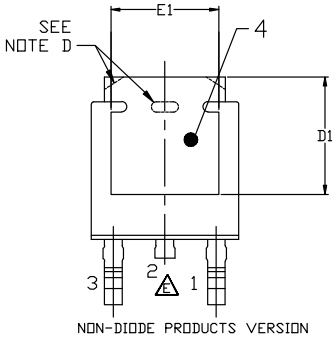


DPAK3 6.10x6.54x2.29, 4.57P
CASE 369AS
ISSUE B

DATE 20 DEC 2023

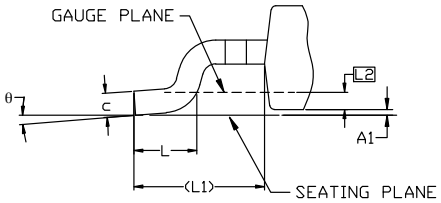


NON-DIODE PRODUCTS VERSION



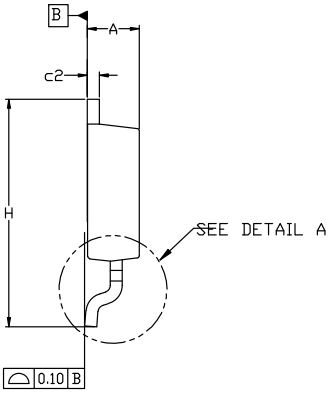
NON-DIODE PRODUCTS VERSION

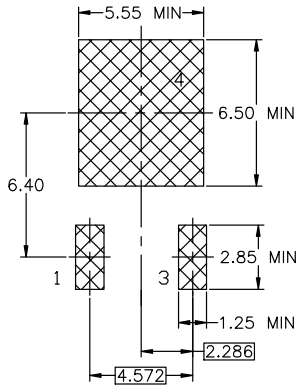
NOTES: UNLESS OTHERWISE SPECIFIED
A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE F, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-2018.
D) SUPPLIER DEPENDENT MOLD LOCKING HOLES OR CHAMFERED CORNERS OR EDGE PROTRUSION.
E) FOR DIODE PRODUCTS, L4 IS 0.25 MM MAX PLASTIC BODY STUB WITHOUT CENTER LEAD.
F) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH AND TIE BAR EXTRUSIONS.
G) LAND PATTERN RECOMMENDATION IS BASED ON IPC7351A STD TO228P991X239-3N.



DETAIL A
(ROTATED -90°)
SCALE: 12X

DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	2.18	2.29	2.39
A1	0.00	–	0.127
b	0.64	0.77	0.89
b2	0.76	0.95	1.14
b3	5.21	5.34	5.46
c	0.45	0.53	0.61
c2	0.45	0.52	0.58
D	5.97	6.10	6.22
D1	5.21	---	---
E	6.35	6.54	6.73
E1	4.32	---	---
e	2.286 BSC		
e1	4.572 BSC		
H	9.40	9.91	10.41
L	1.40	1.59	1.78
L1	2.90 REF		
L2	0.51 BSC		
L3	0.89	1.08	1.27
L4	---	---	1.02
θ	0°	---	10°





LAND PATTERN RECOMMENDATION

*FOR ADDITIONAL INFORMATION ON OUR PB-FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ON SEMICONDUCTOR SOLDERING AND MOUNTING TECHNIQUES REFERENCE MANUAL, SOLDERRM/D.

GENERIC MARKING DIAGRAM*

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

DOCUMENT NUMBER:	**98AON13810G**	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped “CONTROLLED COPY” in red.
DESCRIPTION:	**DPAK3 6.10x6.54x2.29, 4.57P**	**PAGE 1 OF 1**

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales