

# ECOSPARK<sup>®</sup> Ignition IGBT

## 300 mJ, 400 V, N-Channel Ignition IGBT

### ISL9V3040D3STV

#### Features

- SCIS Energy = 300 mJ at  $T_J = 25^\circ\text{C}$
- Logic Level Gate Drive
- This Device is Pb-Free and is RoHS Compliant
- AEC-Q101 Qualified and PPAP Capable

#### Applications

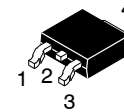
- Automotive Ignition Coil Driver Circuits
- High Current Ignition System
- Coil on Plug Applications

#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ Unless Otherwise Stated)

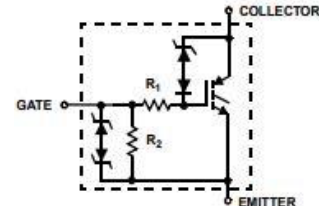
Parameter	Symbol	Value	Units
Collector to Emitter Breakdown Voltage ( $I_C = 1\text{ mA}$ )	$BV_{\text{CER}}$	400	V
Emitter to Collector Voltage – Reverse Battery Condition ( $I_C = 10\text{ mA}$ )	$BV_{\text{ECS}}$	24	V
ISCIS = 14.2 A, $L = 3.0\text{ mHz}$ , $R_{\text{GE}} = 1\text{ K}\Omega$ (Note 1), $T_C = 25^\circ\text{C}$	$E_{\text{SCIS25}}$	300	mJ
ISCIS = 10.6 A, $L = 3.0\text{ mHz}$ , $R_{\text{GE}} = 1\text{ K}\Omega$ (Note 2), $T_C = 150^\circ\text{C}$	$E_{\text{SCIS150}}$	170	mJ
Collector Current Continuous, at $V_{\text{GE}} = 4.0\text{ V}$ , $T_C = 25^\circ\text{C}$	$IC_{25}$	21	A
Collector Current Continuous, at $V_{\text{GE}} = 4.0\text{ V}$ , $T_C = 110^\circ\text{C}$	$IC_{110}$	17	A
Gate to Emitter Voltage Continuous	$V_{\text{GEM}}$	$\pm 10$	V
Power Dissipation Total, $T_C = 25^\circ\text{C}$	PD	150	W
Power Dissipation Derating, $T_C > 25^\circ\text{C}$	PD	1	W/ $^\circ\text{C}$
Operating Junction and Storage Temperature	$T_J, T_{\text{STG}}$	$-55$ to $175$	$^\circ\text{C}$
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	$T_L$	300	$^\circ\text{C}$
Reflow soldering according to JESD020C	$T_{\text{PKG}}$	260	$^\circ\text{C}$
HBM-Electrostatic Discharge Voltage at 100 pF, 1500 $\Omega$	ESD	4	kV
CDM-Electrostatic Discharge Voltage at 1 $\Omega$	ESD	2	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.

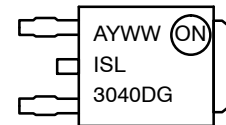
1. Self Clamped inductive Switching Energy ( $E_{\text{SCIS25}}$ ) of 300 mJ is based on the test conditions that is starting  $T_J = 25^\circ\text{C}$ ,  $L = 3\text{ mHz}$ ,  $\text{ISCIS} = 14.2\text{ A}$ ,  $V_{\text{CC}} = 100\text{ V}$  during inductor charging and  $V_{\text{CC}} = 0\text{ V}$  during time in clamp.
2. Self Clamped inductive Switching Energy ( $E_{\text{SCIS150}}$ ) of 170 mJ is based on the test conditions that is starting  $T_J = 150^\circ\text{C}$ ,  $L = 3\text{ mHz}$ ,  $\text{ISCIS} = 10.6\text{ A}$ ,  $V_{\text{CC}} = 100\text{ V}$  during inductor charging and  $V_{\text{CC}} = 0\text{ V}$  during time in clamp.



DPAK (SINGLE GAUGE)  
CASE 369C



#### MARKING DIAGRAM



ISL3040DG = Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

#### ORDERING INFORMATION

Device	Package	Shipping <sup>†</sup>
ISL9V3040D3STV	DPAK (Pb-Free)	2500 / Tape & Reel

<sup>†</sup>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](http://BRD8011/D).

# ISL9V3040D3STV

## THERMAL RESISTANCE RATINGS

Characteristic	Symbol	Max	Units
Junction-to-Case – Steady State (Drain) (Notes 1, 3 and 4)	$R_{\theta JC}$	1	°C/W

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ Unless Otherwise Specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
-----------	--------	----------------	-----	-----	-----	------

### OFF CHARACTERISTICS

Collector to Emitter Breakdown Voltage	$BV_{\text{CER}}$	$I_{\text{CE}} = 2 \text{ mA}$ , $V_{\text{GE}} = 0 \text{ V}$ , $R_{\text{GE}} = 1 \text{ K}\Omega$ , $T_J = -40 \text{ to } 150^\circ\text{C}$	370	400	430	V
Collector to Emitter Breakdown Voltage	$BV_{\text{CES}}$	$I_{\text{CE}} = 10 \text{ mA}$ , $V_{\text{GE}} = 0 \text{ V}$ , $R_{\text{GE}} = 0$ , $T_J = -40 \text{ to } 150^\circ\text{C}$	390	420	450	V
Emitter to Collector Breakdown Voltage	$BV_{\text{ECS}}$	$I_{\text{CE}} = -75 \text{ mA}$ , $V_{\text{GE}} = 0 \text{ V}$ , $T_J = 25^\circ\text{C}$	30	–	–	V
Gate to Emitter Breakdown Voltage	$BV_{\text{GES}}$	$I_{\text{GES}} = \pm 2 \text{ mA}$	$\pm 12$	$\pm 14$	–	V
Collector to Emitter Leakage Current	$I_{\text{CER}}$	$V_{\text{CE}} = 175 \text{ V}$ , $R_{\text{GE}} = 1 \text{ K}\Omega$	$T_J = 25^\circ\text{C}$	–	–	25 $\mu\text{A}$
			$T_J = 150^\circ\text{C}$	–	–	1 mA
Emitter to Collector Leakage Current	$I_{\text{ECS}}$	$V_{\text{EC}} = 24 \text{ V}$	$T_J = 25^\circ\text{C}$	–	–	1 mA
			$T_J = 150^\circ\text{C}$	–	–	40
Series Gate Resistance	$R_1$		–	70	–	$\Omega$
Gate to Emitter Resistance	$R_2$		10 K	–	26 K	$\Omega$

### ON CHARACTERISTICS

Collector to Emitter Saturation Voltage	$V_{\text{CE(SAT)}}$	$I_{\text{CE}} = 6 \text{ A}$ , $V_{\text{GE}} = 4 \text{ V}$ , $T_J = 25^\circ\text{C}$	–	1.25	1.65	V
Collector to Emitter Saturation Voltage	$V_{\text{CE(SAT)}}$	$I_{\text{CE}} = 10 \text{ A}$ , $V_{\text{GE}} = 4.5 \text{ V}$ , $T_J = 150^\circ\text{C}$	–	1.58	1.80	V
Collector to Emitter Saturation Voltage	$V_{\text{CE(SAT)}}$	$I_{\text{CE}} = 15 \text{ A}$ , $V_{\text{GE}} = 4.5 \text{ V}$ , $T_J = 150^\circ\text{C}$	–	1.90	2.20	V

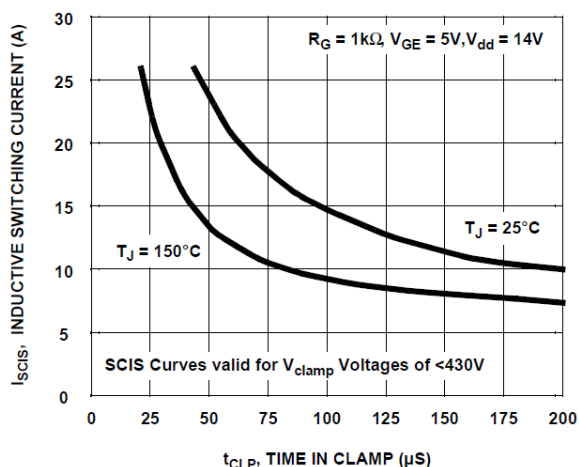
### DYNAMIC CHARACTERISTICS

Gate Charge	$Q_{\text{G(ON)}}$	$I_{\text{CE}} = 10 \text{ A}$ , $V_{\text{CE}} = 12 \text{ V}$ , $V_{\text{GE}} = 5 \text{ V}$	–	17	–	nC
Gate to Emitter Threshold Voltage	$V_{\text{GE(TH)}}$	$I_{\text{CE}} = 1 \text{ mA}$ , $V_{\text{CE}} = V_{\text{GE}}$	$T_J = 25^\circ\text{C}$	1.3	–	2.2 V
			$T_J = 150^\circ\text{C}$	0.75	–	1.8
Gate to Emitter Plateau Voltage	$V_{\text{GEP}}$	$V_{\text{CE}} = 12 \text{ V}$ , $I_{\text{CE}} = 10 \text{ A}$	–	3.0	–	V

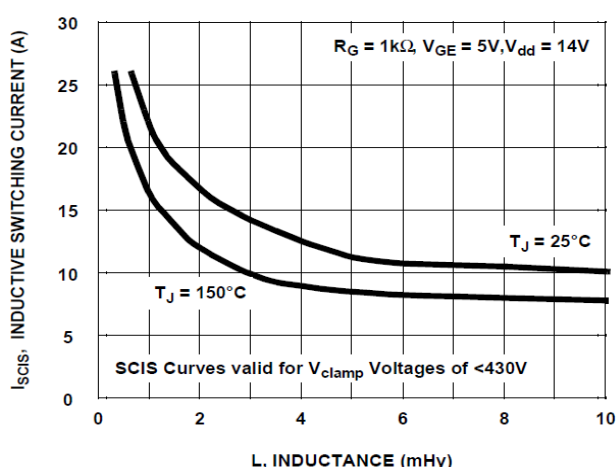
### SWITCHING CHARACTERISTICS

Current Turn-On Delay Time-Resistive	$t_{\text{d(ON)R}}$	$V_{\text{CE}} = 14 \text{ V}$ , $R_L = 1 \Omega$ , $V_{\text{GE}} = 5 \text{ V}$ , $R_G = 470 \Omega$ , $T_J = 25^\circ\text{C}$	–	0.7	4	$\mu\text{s}$
Current Rise Time-Resistive	$t_{\text{rR}}$		–	2.1	7	
Current Turn-Off Delay Time-Inductive	$t_{\text{d(OFF)L}}$	$V_{\text{CE}} = 300 \text{ V}$ , $L = 1 \text{ mH}$ , $V_{\text{GE}} = 5 \text{ V}$ , $R_G = 470 \Omega$ , $I_{\text{CE}} = 6.5 \text{ A}$ , $T_J = 25^\circ\text{C}$	–	4.8	15	
Current Fall Time-Inductive	$t_{\text{fL}}$		–	2.8	15	

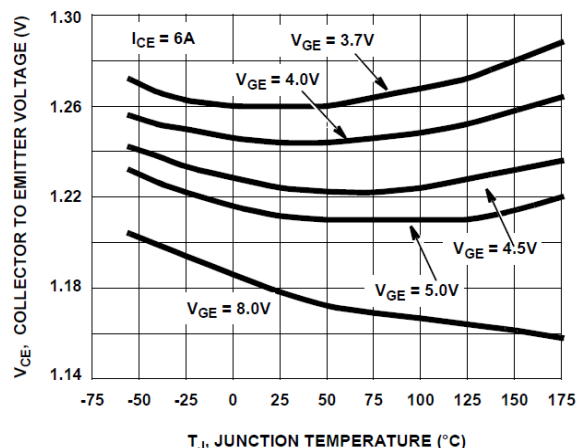
# TYPICAL CHARACTERISTICS



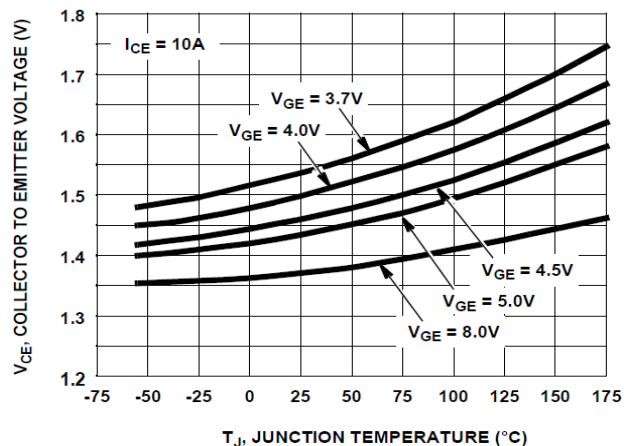
**Figure 1. Self Clamped Inductive Switching Current vs. Time in Clamp**



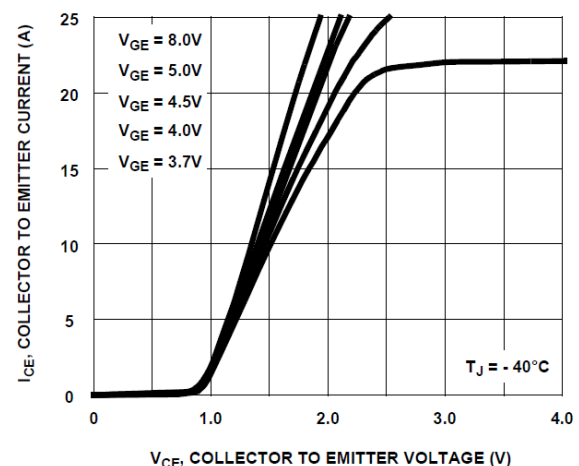
**Figure 2. Self Clamped Inductive Switching Current vs. Inductance**



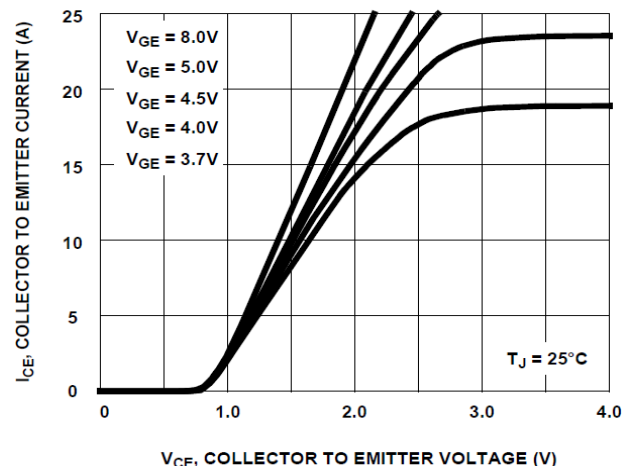
**Figure 3. Collector to Emitter On-State Voltage vs. Junction Temperature**



**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)

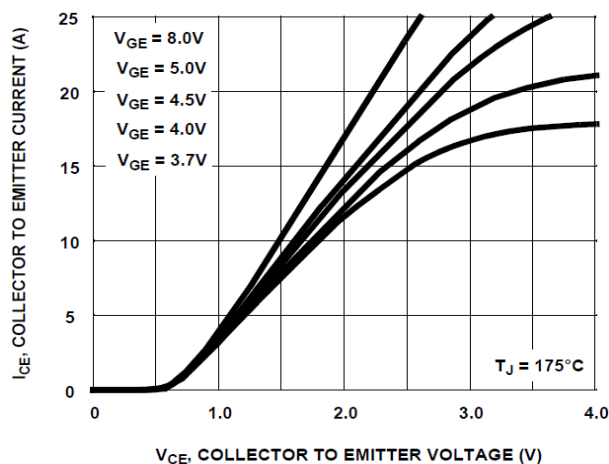


Figure 7. Collector to Emitter On-State Voltage vs. Collector Current

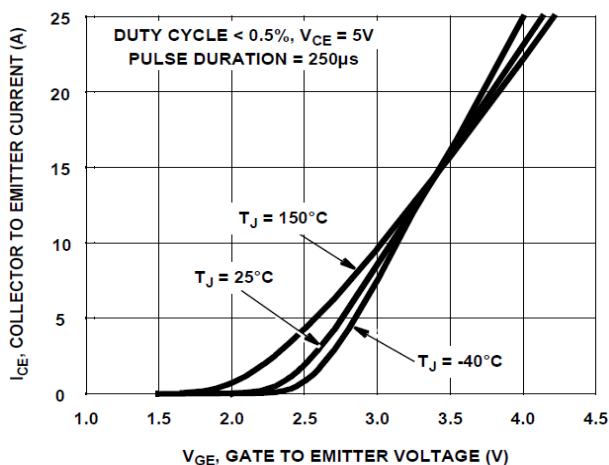


Figure 8. Transfer Characteristics

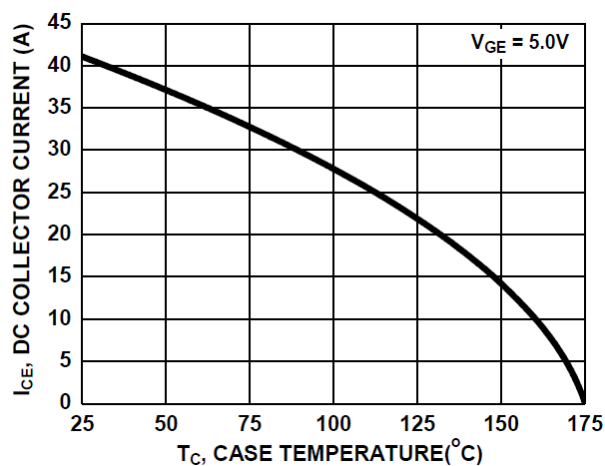


Figure 9. DC Collector Current vs. Case Temperature

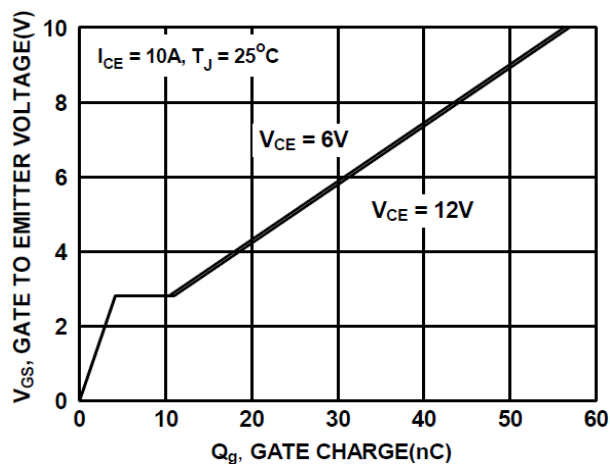


Figure 10. Gate Charge

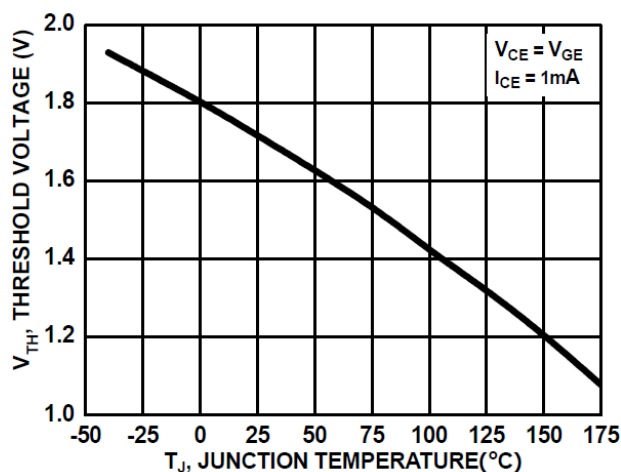


Figure 11. Threshold Voltage vs. Junction Temperature

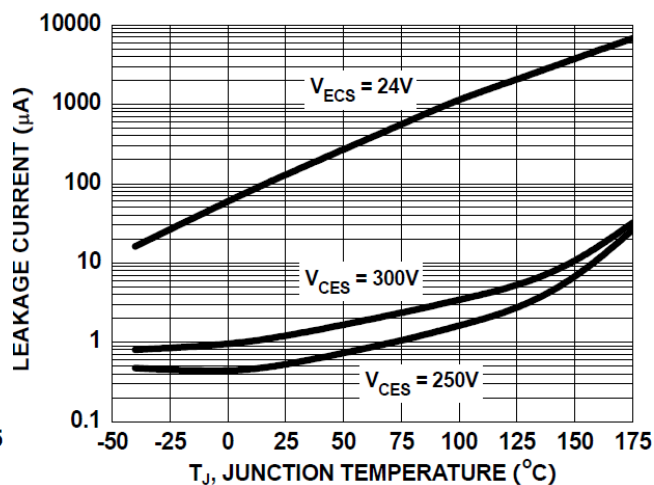


Figure 12. Leakage Current vs. Junction Temperature

# ISL9V3040D3STV

## TYPICAL CHARACTERISTICS (continued)

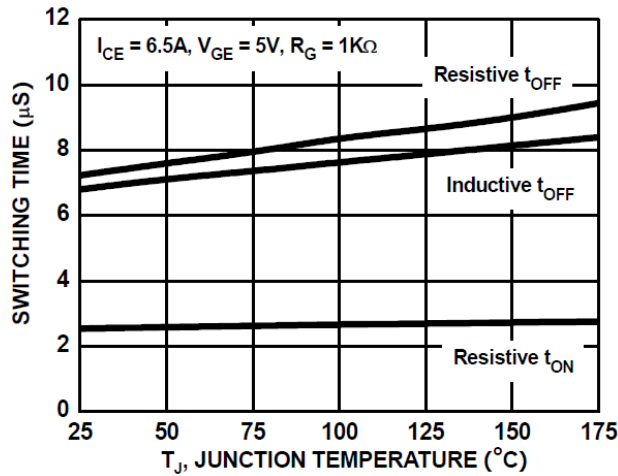


Figure 13. Switching Time vs. Junction Temperature

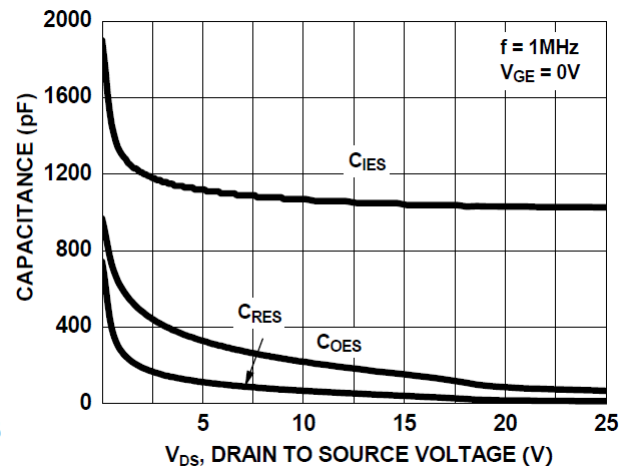


Figure 14. Capacitance vs. Collector to Emitter Voltage

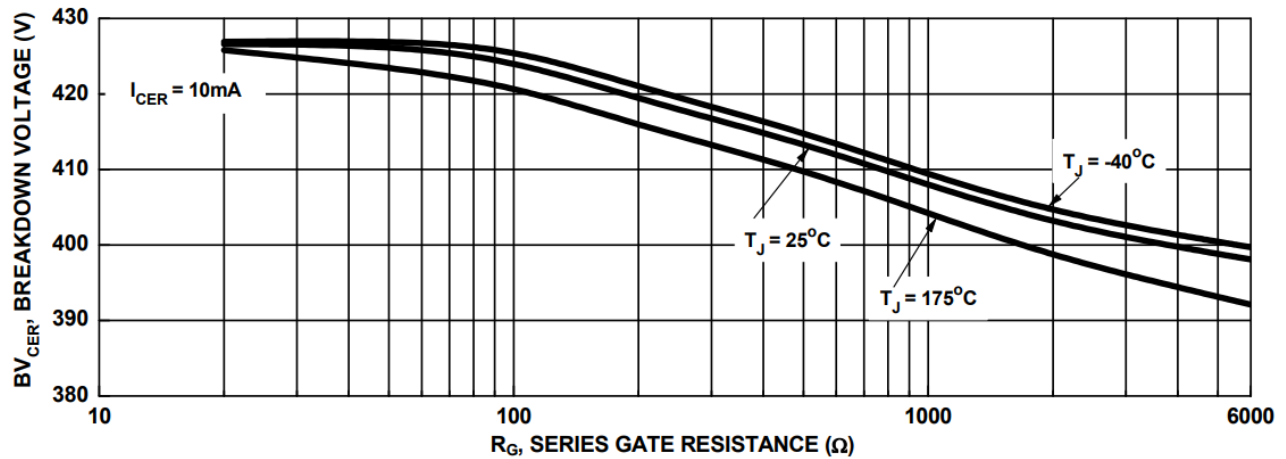


Figure 15. Break down Voltage vs. Series Resistance

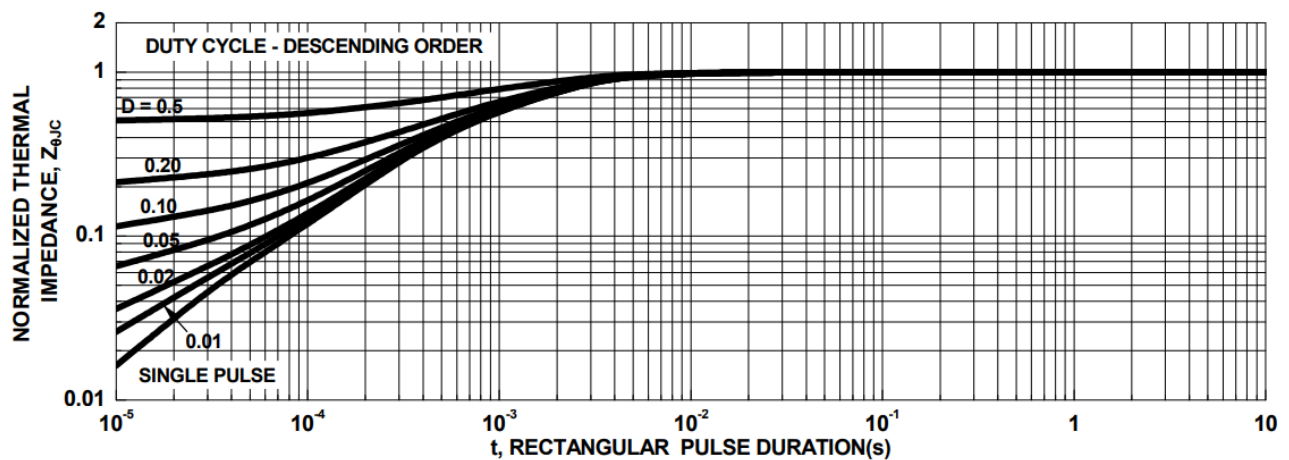


Figure 16. IGBT Normalized Transient Thermal Impedance, Junction to Case

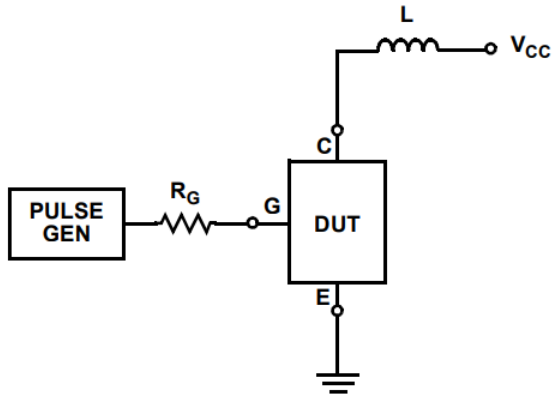


Figure 17. Inductive Switching Test Circuit

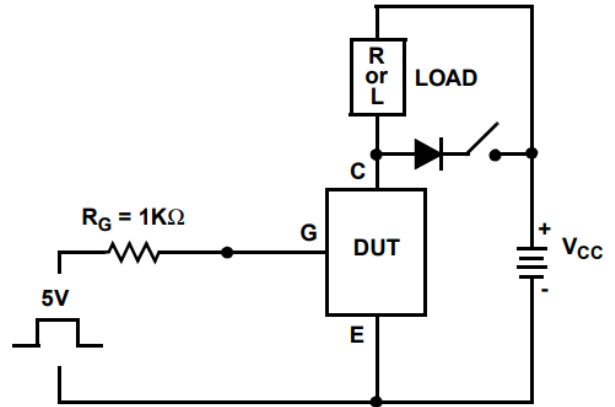


Figure 18.  $t_{ON}$  and  $t_{OFF}$  Switching Test Circuit

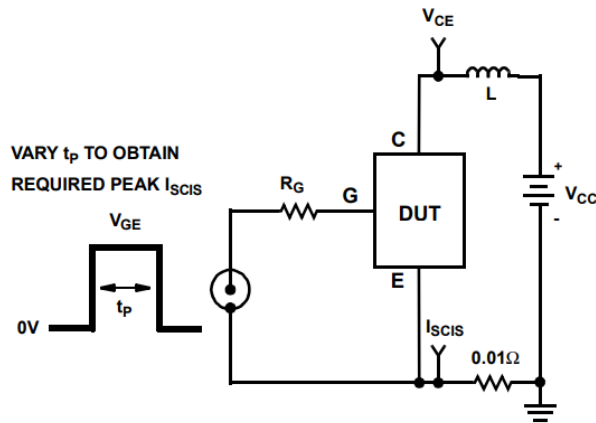


Figure 19. Energy Test Circuit

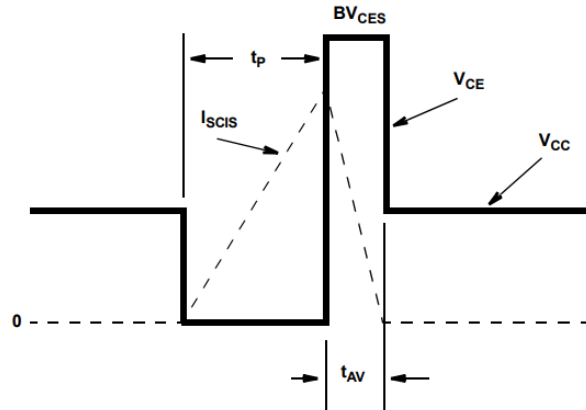


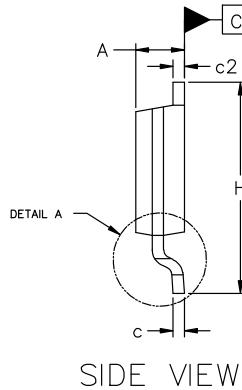
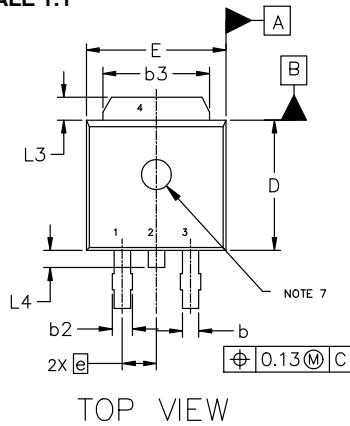
Figure 20. Energy Waveforms



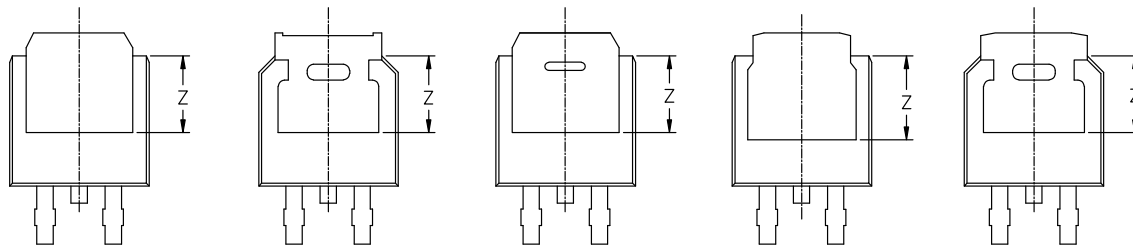
DPAK3 6.10x6.54x2.28, 2.29P  
CASE 369C  
ISSUE H

DATE 15 JUL 2025

SCALE 1:1

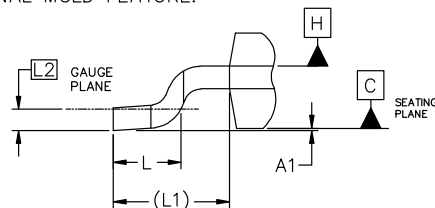


MILLIMETERS			
DIM	MIN	NOM	MAX
A	2.18	2.28	2.38
A1	0.00	---	0.13
b	0.63	0.76	0.89
b2	0.72	0.93	1.14
b3	4.57	5.02	5.46
c	0.46	0.54	0.61
c2	0.46	0.54	0.61
D	5.97	6.10	6.22
E	6.35	6.54	6.73
e	2.29 BSC		
H	9.40	9.91	10.41
L	1.40	10.10	1.78
L1	2.90 REF		
L2	0.51 BSC		
L3	0.89	---	1.27
L4	---	---	1.01
Z	3.93	---	---



NOTES:

1. DIMENSIONING AND TOLERANCING ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3, AND Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.15mm PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.
7. OPTIONAL MOLD FEATURE.



RECOMMENDED MOUNTING FOOTPRINT\*

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

DOCUMENT NUMBER:	98AON10527D	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 6.10x6.54x2.28, 2.29P	PAGE 1 OF 2

onsemi and Onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

**DPAK3 6.10x6.54x2.28, 2.29P**  
CASE 369C  
ISSUE H

DATE 15 JUL 2025

**GENERIC  
MARKING DIAGRAM\***



XXXXXX = Device Code  
A = Assembly Location  
L = Wafer Lot  
Y = Year  
WW = Work Week  
G = Pb-Free Package

\*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.

STYLE 1: PIN 1. BASE 2. COLLECTOR 3. EMITTER 4. COLLECTOR	STYLE 2: PIN 1. GATE 2. DRAIN 3. SOURCE 4. DRAIN	STYLE 3: PIN 1. ANODE 2. CATHODE 3. ANODE 4. CATHODE	STYLE 4: PIN 1. CATHODE 2. ANODE 3. GATE 4. ANODE	STYLE 5: PIN 1. GATE 2. ANODE 3. CATHODE 4. ANODE
STYLE 6: PIN 1. MT1 2. MT2 3. GATE 4. MT2	STYLE 7: PIN 1. GATE 2. COLLECTOR 3. EMITTER 4. COLLECTOR	STYLE 8: PIN 1. N/C 2. CATHODE 3. ANODE 4. CATHODE	STYLE 9: PIN 1. ANODE 2. CATHODE 3. RESISTOR ADJUST 4. CATHODE	STYLE 10: PIN 1. CATHODE 2. ANODE 3. CATHODE 4. ANODE

<b>DOCUMENT NUMBER:</b>	<b>98AON10527D</b>	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
<b>DESCRIPTION:</b>	<b>DPAK3 6.10x6.54x2.28, 2.29P</b>	<b>PAGE 2 OF 2</b>

**onsemi** and **Onsemi** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.



**onsemi**, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at [www.onsemi.com/site/pdf/Patent-Marking.pdf](http://www.onsemi.com/site/pdf/Patent-Marking.pdf). **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

## ADDITIONAL INFORMATION

### TECHNICAL PUBLICATIONS:

Technical Library: [www.onsemi.com/design/resources/technical-documentation](http://www.onsemi.com/design/resources/technical-documentation)  
onsemi Website: [www.onsemi.com](http://www.onsemi.com)

### ONLINE SUPPORT: [www.onsemi.com/support](http://www.onsemi.com/support)

For additional information, please contact your local Sales Representative at  
[www.onsemi.com/support/sales](http://www.onsemi.com/support/sales)