ISL9V3040D3STV

ECOSPARK® Ignition IGBT

300 mJ, 400 V, N−Channel Ignition IGBT

ON Semiconductor®

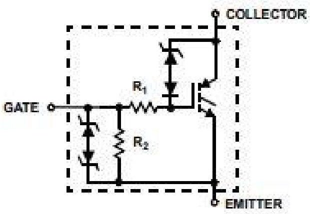
www.onsemi.com

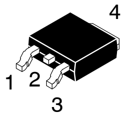
Features

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

Applications

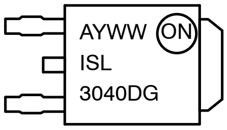
- Automotive Ignition Coil Driver Circuits
- High Current Ignition System
- Coil on Plug Applications





DPAK (SINGLE GAUGE)
CASE 369C

MARKING DIAGRAM



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

ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

MAXIMUM RATINGS (T_J = 25°C Unless Otherwise Stated)

Parameter	Symbol	Value	Units
Collector to Emitter Breakdown Voltage (I_C = 1 mA)	BV_{CER}	400	V
Emitter to Collector Voltage − Reverse Battery Condition (I_C = 10 mA)	BV_{ECS}	24	V
ISCIS = 14.2 A, L = 3.0 mHz, R_{GE} = 1 KΩ (Note 1), T_C = 25°C	E_{SCIS25}	300	mJ
ISCIS = 10.6 A, L = 3.0 mHz, R_{GE} = 1 KΩ (Note 2), T_C = 150°C	$E_{SCIS150}$	170	mJ
Collector Current Continuous, at V_{GE} = 4.0 V, T_C = 25°C	IC25	21	A
Collector Current Continuous, at V_{GE} = 4.0 V, T_C = 110°C	IC110	17	A
Gate to Emitter Voltage Continuous	V_{GEM}	±10	V
Power Dissipation Total, T_C = 25°C	PD	150	W
Power Dissipation Derating, T_C > 25°C	PD	1	W/°C
Operating Junction and Storage Temperature	T_J, T_{STG}	−55 to 175	°C
Lead Temperature for Soldering Purposes (1/8” from case for 10 s)	T_L	300	°C
Reflow soldering according to JESD020C	T_{PKG}	260	°C
HBM−Electrostatic Discharge Voltage at100 pF, 1500 Ω	ESD	4	kV
CDM−Electrostatic Discharge Voltage at 1 Ω	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 (ESCIS25) of 300 mJ is based on the test conditions that is starting T_J = 25°C, L = 3 mHz, ISCIS = 14.2 A, V_{CC} = 100 V during inductor charging and V_{CC} = 0 V during time in clamp.
2. Self Clamped inductive Switching Energy (ESCIS150) of 170 mJ is based on the test conditions that is starting T_J = 150°C, L = 3 mHz, ISCIS = 10.6 A, V_{CC} = 100 V during inductor charging and V_{CC} = 0 V during time in clamp.

May, 2019 − Rev. 0

Publication Order Number:
ISL9V3040D3STV/D

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°C Unless Otherwise Specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Collector to Emitter Breakdown Voltage	BV_{CER}	I_{CE} = 2 mA, V_{GE} = 0 V, R_{GE} = 1 KΩ, T_J = −40 to 150°C		370	400	430	V
Collector to Emitter Breakdown Voltage	BV_{CES}	I_{CE} = 10 mA, V_{GE} = 0 V, R_{GE} = 0, T_J = −40 to 150°C		390	420	450	V
Emitter to Collector Breakdown Voltage	BV_{ECS}	I_{CE} = −75 mA, V_{GE} = 0 V, T_J = 25°C		30	–	–	V
Gate to Emitter Breakdown Voltage	BV_{GES}	I_{GES} = ±2 mA		±12	±14	–	V
Collector to Emitter Leakage Current	I_{CER}	V_{CE} = 175 V, R_{GE} = 1 KΩ	T_J = 25°C	–	–	25	μA
			T_J = 150°C	–	–	1	mA
Emitter to Collector Leakage Current	I_{ECS}	V_{EC} = 24 V	T_J = 25°C	–	–	1	mA
			T_J = 150°C	–	–	40	
Series Gate Resistance	R_1			–	70	–	Ω
Gate to Emitter Resistance	R_2			10 K	–	26 K	Ω
ON CHARACTERISTICS							
Collector to Emitter Saturation Voltage	$V_{CE(SAT)}$	I_{CE} = 6 A, V_{GE} = 4 V T_J = 25°C		–	1.25	1.65	V
Collector to Emitter Saturation Voltage	$V_{CE(SAT)}$	I_{CE} = 10 A, V_{GE} = 4.5 V T_J = 150°C		–	1.58	1.80	V
Collector to Emitter Saturation Voltage	$V_{CE(SAT)}$	I_{CE} = 15 A, V_{GE} = 4.5 V T_J = 150°C		–	1.90	2.20	V
DYNAMIC CHARACTERISTICS							
Gate Charge	$Q_{G(ON)}$	I_{CE} = 10 A, V_{CE} = 12 V, V_{GE} = 5 V		–	17	–	nC
Gate to Emitter Threshold Voltage	$V_{GE(TH)}$	I_{CE} = 1 mA, V_{CE} = V_{GE}	T_J = 25°C	1.3	–	2.2	V
			T_J = 150°C	0.75	–	1.8	
Gate to Emitter Plateau Voltage	V_{GEP}	V_{CE} = 12 V, I_{CE} = 10 A		–	3.0	–	V
SWITCHING CHARACTERISTICS							
Current Turn−On Delay Time−Resistive	$td_{(ON)R}$	V_{CE} = 14 V, R_L = 1 Ω V_{GE} = 5 V, R_G = 470 Ω T_J = 25°C		–	0.7	4	μs
Current Rise Time−Resistive	t_{rR}			–	2.1	7	
Current Turn−Off Delay Time−Inductive	$td_{(OFF)L}$	V_{CE} = 300 V, L = 1 mH, V_{GE} = 5 V, R_G = 470 Ω I_{CE} = 6.5 A, T_J = 25°C		–	4.8	15	
Current Fall Time−Inductive	tfL			–	2.8	15	

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Reel Diameter	Tape Width	Qty
ISL9V3040G1	ISL9V3040D3STV	DPAK (Pb−Free)	330 mm	16 mm	2500

†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.

TYPICAL CHARACTERISTICS

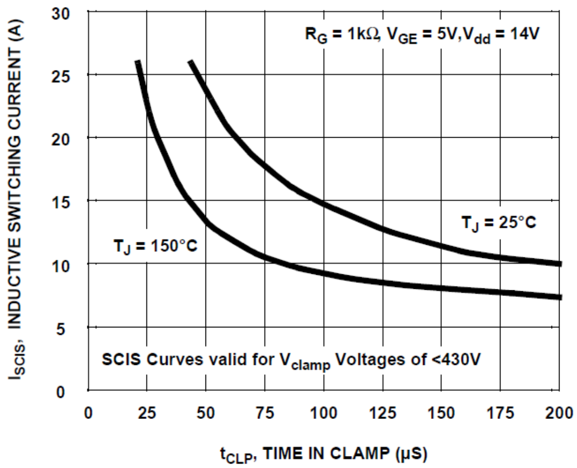


Figure 1. Self Clamped Inductive Switching Current vs. Time in Clamp

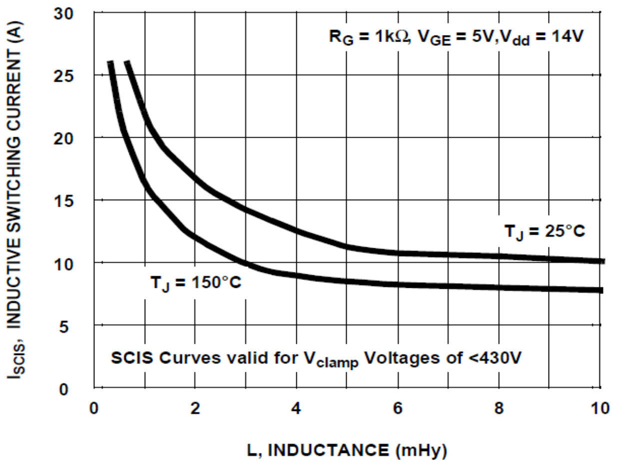


Figure 2. Self Clamped Inductive Switching Current vs. Inductance

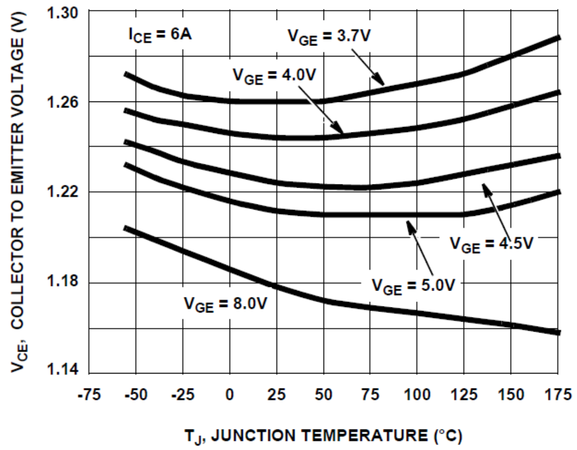


Figure 3. Collector to Emitter On−State Voltage vs. Junction Temperature

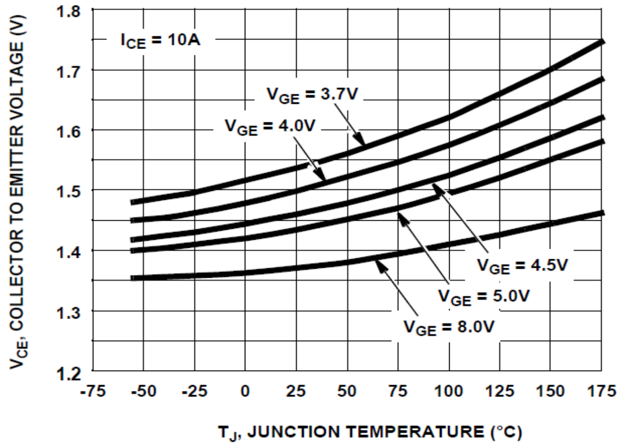


Figure 4. Collector to Emitter On−State Voltage vs. Junction Temperature

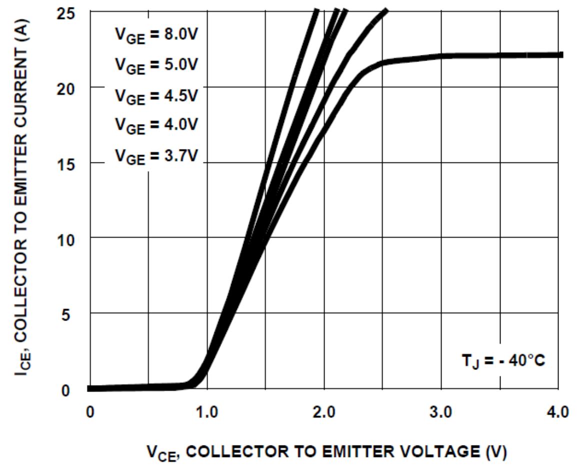


Figure 5. Collector to Emitter On−State Voltage vs. Collector Current

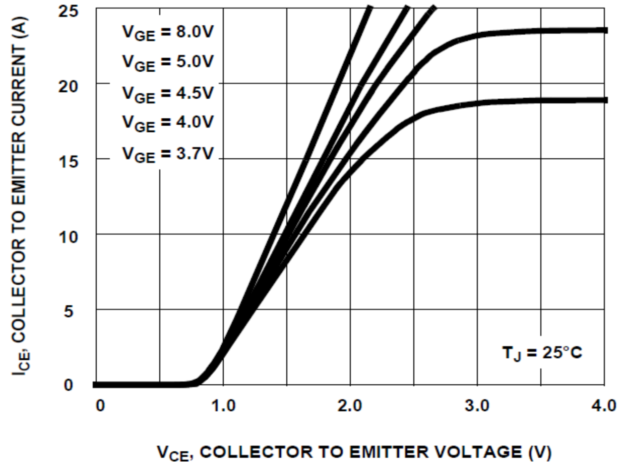


Figure 6. Collector to Emitter On− State Voltage vs. Collector Current

TYPICAL CHARACTERISTICS (continued)

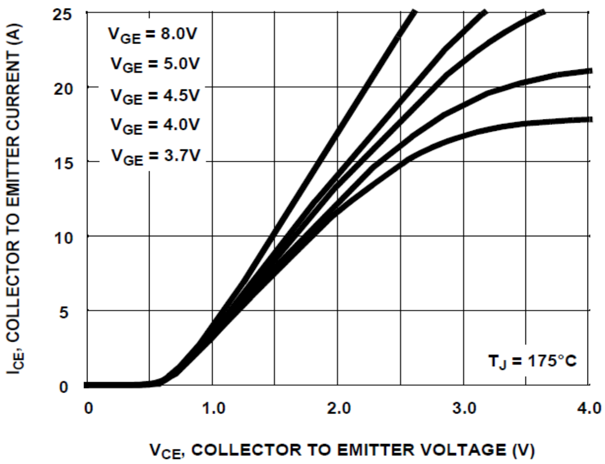


Figure 7. Collector to Emitter On−State Voltage vs. Collector Current

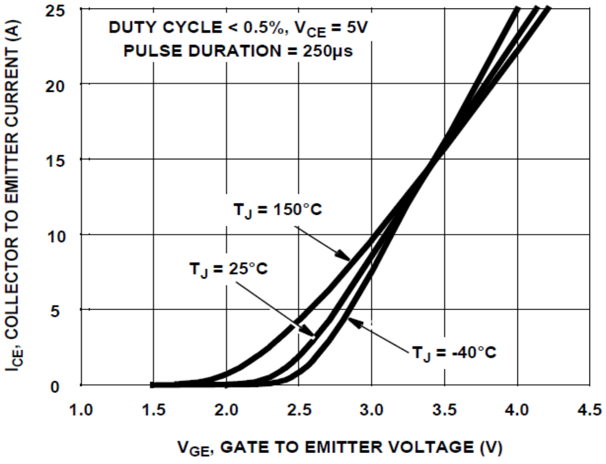


Figure 8. Transfer Characteristics

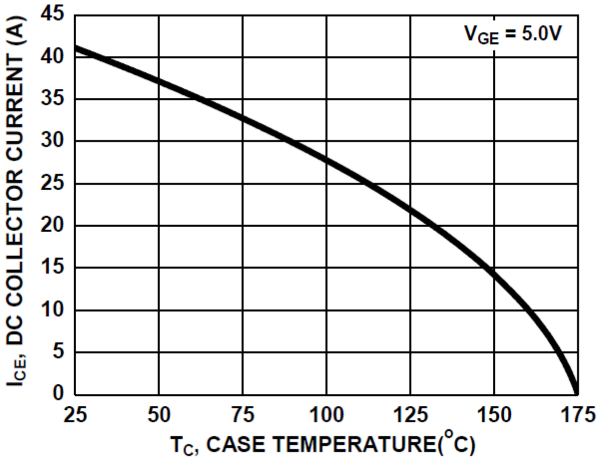


Figure 9. DC Collector Current vs. Case Temperature

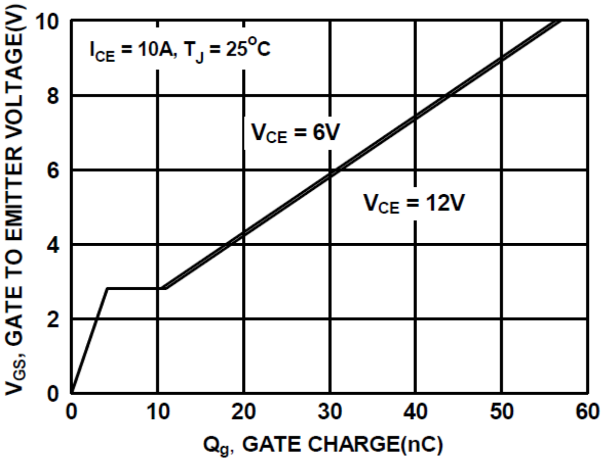


Figure 10. Gate Charge

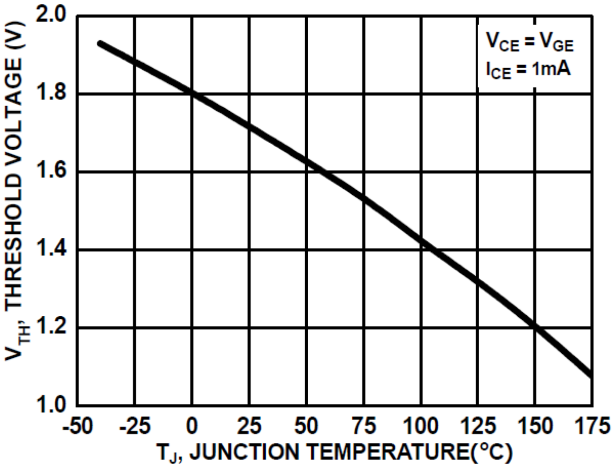


Figure 11. Threshold Voltage vs. Junction Temperature

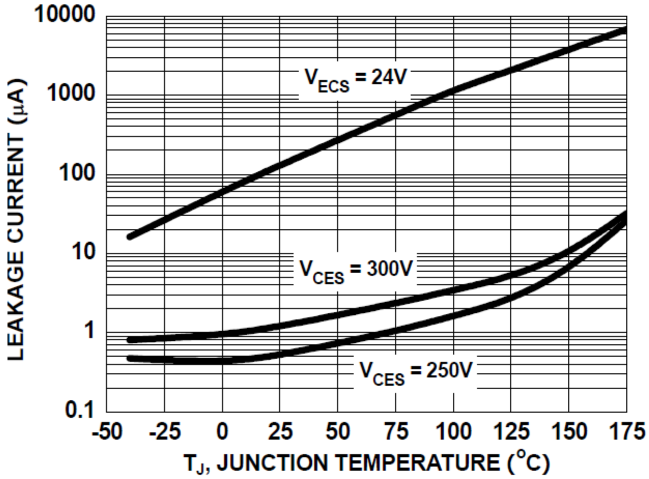


Figure 12. Leakage Current vs. Junction Temperature

TYPICAL CHARACTERISTICS (continued)

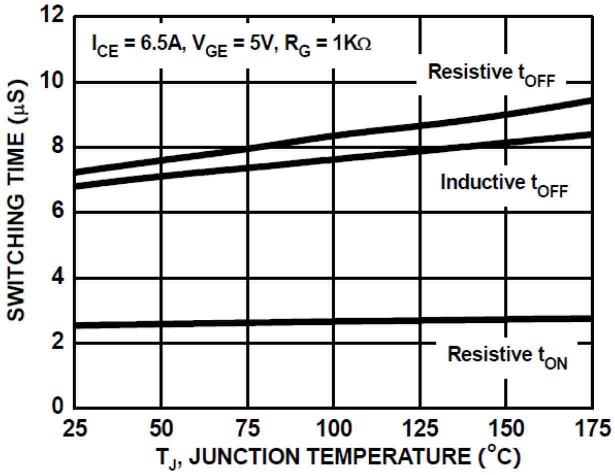


Figure 13. Switching Time vs. Junction Temperature

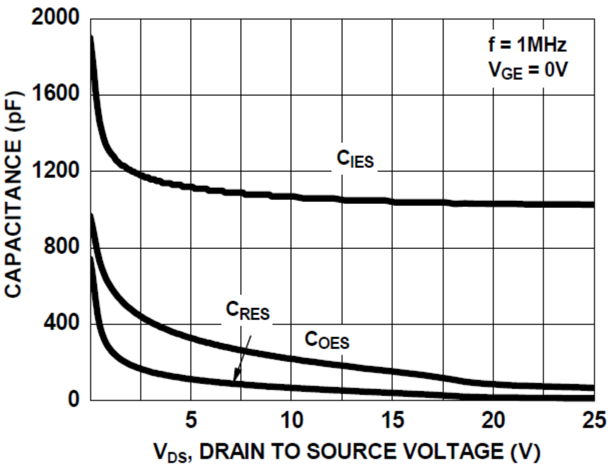


Figure 14. Capacitance vs. Collector to Emitter Voltage

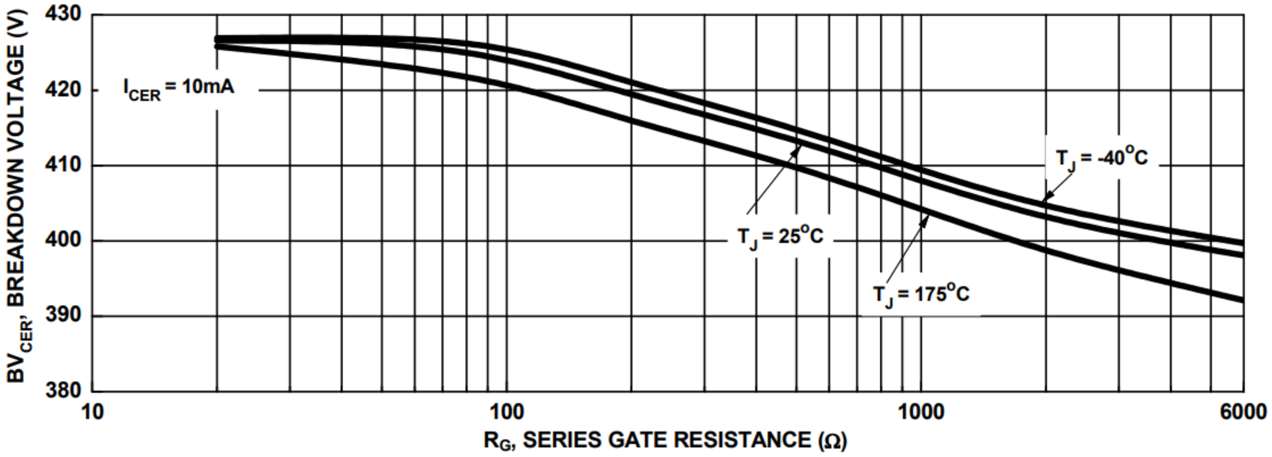


Figure 15. Break down Voltage vs. Series Resistance

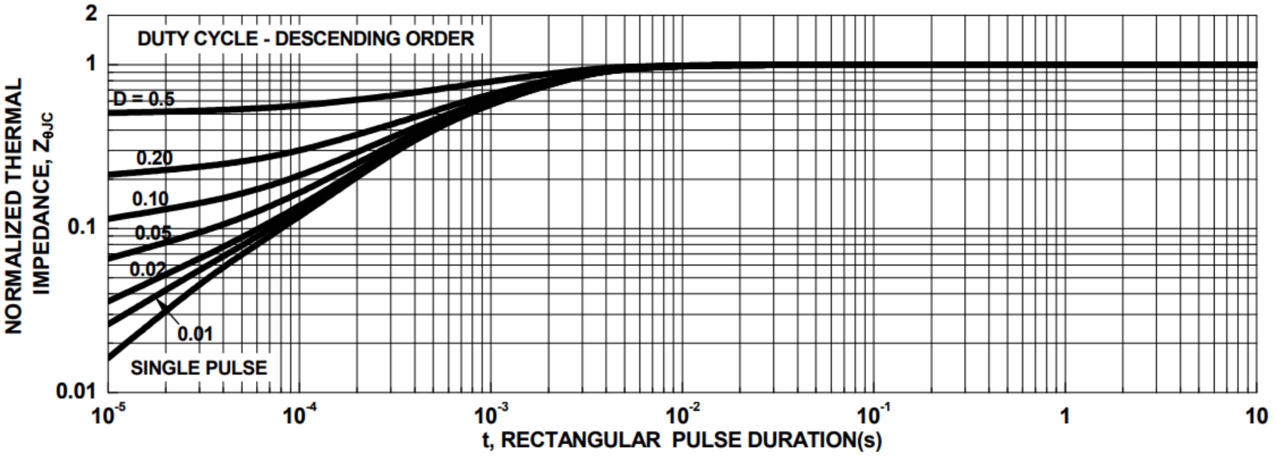


Figure 16. IGBT Normalized Transient Thermal Impedance, Junction to Case

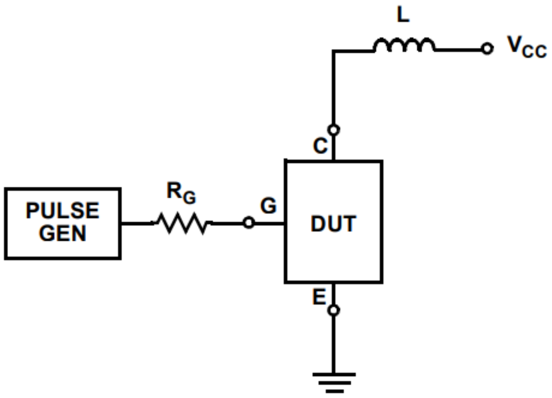


Figure 17. Inductive Switching Test Circuit

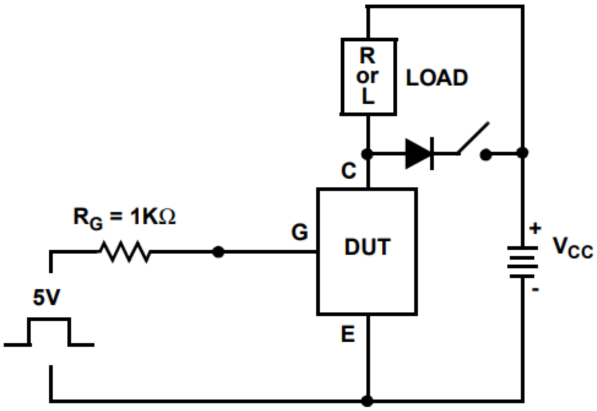


Figure 18. t_{ON} and t_{OFF} Switching Test Circuit

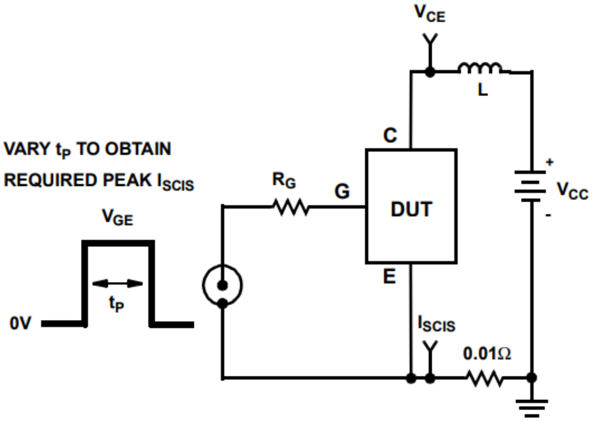


Figure 19. Energy Test Circuit

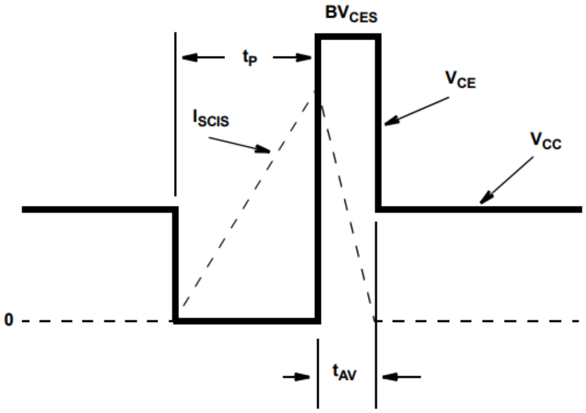


Figure 20. Energy Waveforms

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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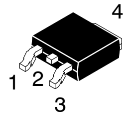
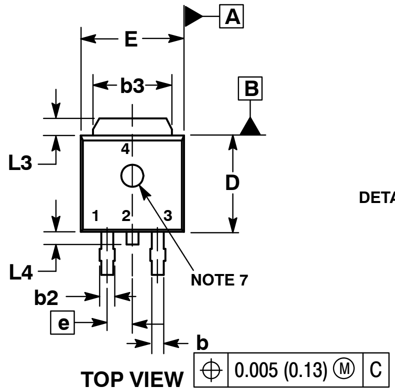


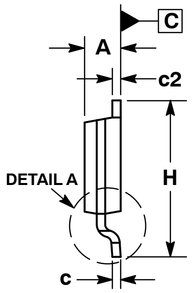
SCALE 1:1

DPAK (SINGLE GAUGE)
CASE 369C
ISSUE F

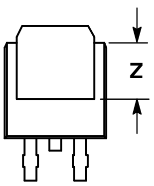
DATE 21 JUL 2015



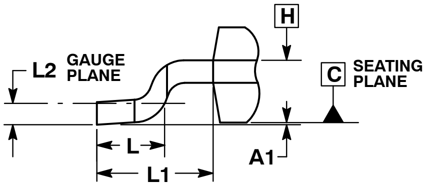
TOP VIEW



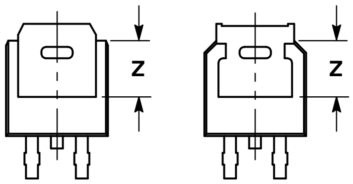
SIDE VIEW



BOTTOM VIEW



DETAIL A
ROTATED 90° CW



BOTTOM VIEW
ALTERNATE
CONSTRUCTIONS

NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
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 0.006 INCHES 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.

	INCHES		MILLIMETERS	
DIM	MIN	MAX	MIN	MAX
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.028	0.045	0.72	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.114 REF		2.90 REF	
L2	0.020 BSC		0.51 BSC	
L3	0.035	0.050	0.89	1.27
L4	---	0.040	---	1.01
Z	0.155	---	3.93	---

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

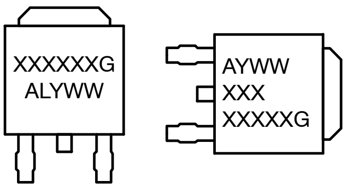
STYLE 7:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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

GENERIC MARKING DIAGRAM*

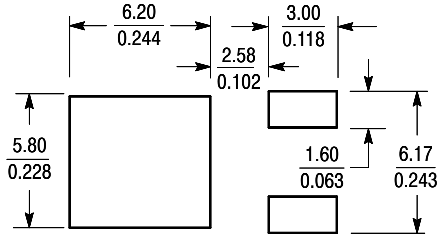


IC **Discrete**

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.

SOLDERING FOOTPRINT*



SCALE 3:1 $\left(\frac{mm}{inches}\right)$

*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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DESCRIPTION:	**DPAK (SINGLE GAUGE)**	**PAGE 1 OF 1**

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- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits,General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.

Как с нами связаться

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