

**Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

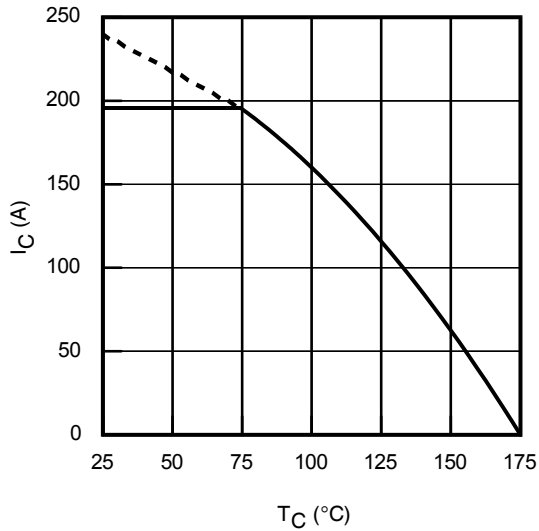
	Parameter	Min.	Typ.	Max.	Units	Conditions
V <sub>(BR)CES</sub>	Collector-to-Emitter Breakdown Voltage	600	—	—	V	V <sub>GE</sub> = 0V, I <sub>C</sub> = 500μA ③
ΔV <sub>(BR)CES</sub> /ΔT <sub>J</sub>	Temperature Coeff. of Breakdown Voltage	—	0.27	—	V/°C	V <sub>GE</sub> = 0V, I <sub>C</sub> = 15mA (25°C-175°C)
V <sub>CE(on)</sub>	Collector-to-Emitter Saturation Voltage	—	1.7	2.05	V	I <sub>C</sub> = 120A, V <sub>GE</sub> = 15V, T <sub>J</sub> = 25°C
		—	2.15	—		I <sub>C</sub> = 120A, V <sub>GE</sub> = 15V, T <sub>J</sub> = 150°C
		—	2.20	—		I <sub>C</sub> = 120A, V <sub>GE</sub> = 15V, T <sub>J</sub> = 175°C
V <sub>GE(th)</sub>	Gate Threshold Voltage	4.0	—	6.5	V	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 5.6mA
ΔV <sub>GE(th)</sub> /ΔT <sub>J</sub>	Threshold Voltage temp. coefficient	—	-17	—	mV/°C	V <sub>CE</sub> = V <sub>GE</sub> , I <sub>C</sub> = 20mA (25°C-175°C)
g <sub>fe</sub>	Forward Transconductance	—	85	—	S	V <sub>CE</sub> = 50V, I <sub>C</sub> = 120A
I <sub>CES</sub>	Collector-to-Emitter Leakage Current	—	2.3	200	μA	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 600V
		—	9.4	—	mA	V <sub>GE</sub> = 0V, V <sub>CE</sub> = 600V, T <sub>J</sub> = 175°C
V <sub>FM</sub>	Diode Forward Voltage Drop	—	1.9	2.2	V	I <sub>F</sub> = 120A
		—	2.0	—		I <sub>F</sub> = 120A, T <sub>J</sub> = 175°C
I <sub>GES</sub>	Gate-to-Emitter Leakage Current	—	—	±100	nA	V <sub>GE</sub> = ±20V

**Switching Characteristics @ T<sub>J</sub> = 25°C (unless otherwise specified)**

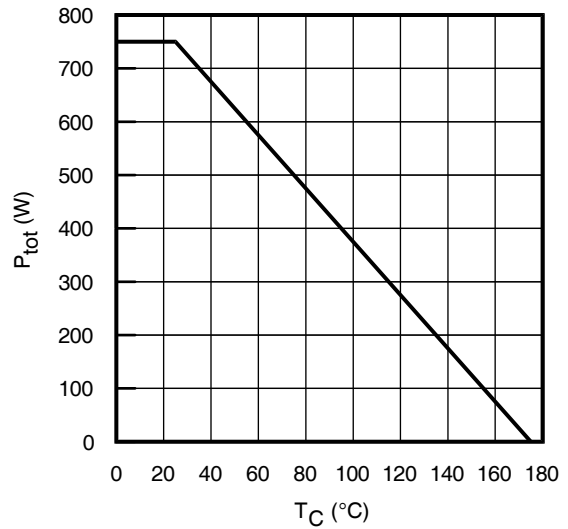
	Parameter	Min.	Typ.	Max.	Units	Conditions
Q <sub>g</sub>	Total Gate Charge (turn-on)	—	240	360	nC	I <sub>C</sub> = 120A V <sub>GE</sub> = 15V V <sub>CC</sub> = 400V
Q <sub>ge</sub>	Gate-to-Emitter Charge (turn-on)	—	69	104		
Q <sub>gc</sub>	Gate-to-Collector Charge (turn-on)	—	90	135		
E <sub>on</sub>	Turn-On Switching Loss	—	8.2	10	mJ	I <sub>C</sub> = 120A, V <sub>CC</sub> = 400V, V <sub>GE</sub> = 15V R <sub>G</sub> = 4.7Ω, L = 87μH, T <sub>J</sub> = 25°C Energy losses include tail & diode reverse recovery
E <sub>off</sub>	Turn-Off Switching Loss	—	2.9	3.2		
E <sub>total</sub>	Total Switching Loss	—	11.1	13.2		
t <sub>d(on)</sub>	Turn-On delay time	—	69	82	ns	I <sub>C</sub> = 120A, V <sub>CC</sub> = 400V, V <sub>GE</sub> = 15V R <sub>G</sub> = 4.7Ω, L = 87μH, T <sub>J</sub> = 175°C Energy losses include tail & diode reverse recovery
t <sub>r</sub>	Rise time	—	65	82		
t <sub>d(off)</sub>	Turn-Off delay time	—	198	230		
t <sub>f</sub>	Fall time	—	38	48		
E <sub>on</sub>	Turn-On Switching Loss	—	10	—	mJ	I <sub>C</sub> = 120A, V <sub>CC</sub> = 400V, V <sub>GE</sub> = 15V R <sub>G</sub> = 4.7Ω, L = 87μH, T <sub>J</sub> = 175°C Energy losses include tail & diode reverse recovery
E <sub>off</sub>	Turn-Off Switching Loss	—	3.8	—		
E <sub>total</sub>	Total Switching Loss	—	13.8	—		
t <sub>d(on)</sub>	Turn-On delay time	—	63	—	ns	I <sub>C</sub> = 120A, V <sub>CC</sub> = 400V, V <sub>GE</sub> = 15V R <sub>G</sub> = 4.7Ω, L = 87μH, T <sub>J</sub> = 175°C Energy losses include tail & diode reverse recovery
t <sub>r</sub>	Rise time	—	64	—		
t <sub>d(off)</sub>	Turn-Off delay time	—	230	—		
t <sub>f</sub>	Fall time	—	51	—		
C <sub>ies</sub>	Input Capacitance	—	7780	—	pF	V <sub>GE</sub> = 0V V <sub>CC</sub> = 30V f = 1.0Mhz
C <sub>oes</sub>	Output Capacitance	—	505	—		
C <sub>res</sub>	Reverse Transfer Capacitance	—	245	—		
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T <sub>J</sub> = 175°C, I <sub>C</sub> = 480A V <sub>CC</sub> = 480V, V <sub>p</sub> ≤ 600V R <sub>G</sub> = 4.7Ω, V <sub>GE</sub> = +20V to 0V
SCSOA	Short Circuit Safe Operating Area	6	—	—	μs	V <sub>CC</sub> = 400V, V <sub>p</sub> ≤ 600V R <sub>G</sub> = 1.0Ω, V <sub>GE</sub> = +15V to 0V
E <sub>rec</sub>	Reverse Recovery Energy of the Diode	—	2440	—	μJ	T <sub>J</sub> = 175°C
t <sub>rr</sub>	Diode Reverse Recovery Time	—	360	—	ns	V <sub>CC</sub> = 400V, I <sub>F</sub> = 120A
I <sub>rr</sub>	Peak Reverse Recovery Current	—	53	—	A	V <sub>GE</sub> = 15V, R <sub>G</sub> = 4.7Ω, L = 87μH

**Notes:**

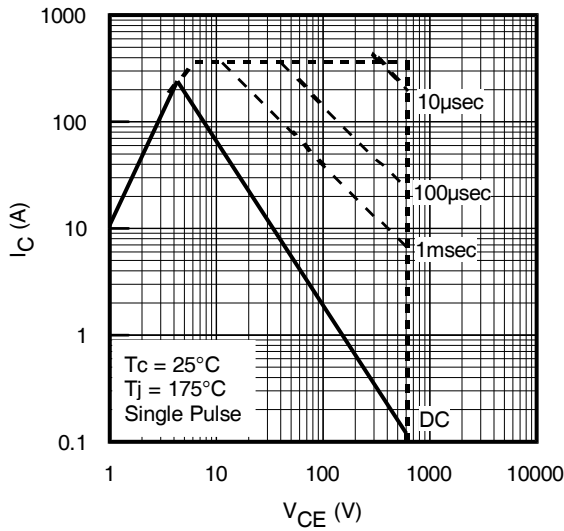
- ① V<sub>CC</sub> = 80% (V<sub>CES</sub>), V<sub>GE</sub> = 20V, L = 0.87μH, R<sub>G</sub> = 50Ω tested in production ILM ≤ 400A.
- ② Pulse width limited by max. junction temperature.
- ③ Refer to AN-1086 for guidelines for measuring V<sub>(BR)CES</sub> safely.
- ④ R<sub>θ</sub> is measured at T<sub>J</sub> approximately 90°C.
- ⑤ Calculated continuous current based on maximum allowable junction temperature. Package IGBT current limit is 195A. Package diode current limit is 120A. Note that current limitations arising from heating of the device leads may occur.



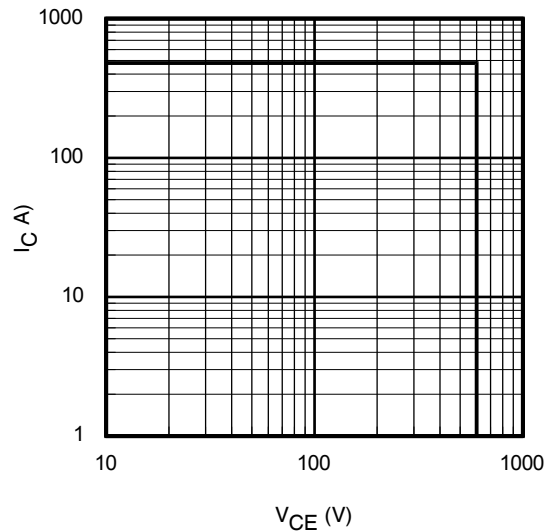
**Fig. 1** - Maximum DC Collector Current vs. Case Temperature



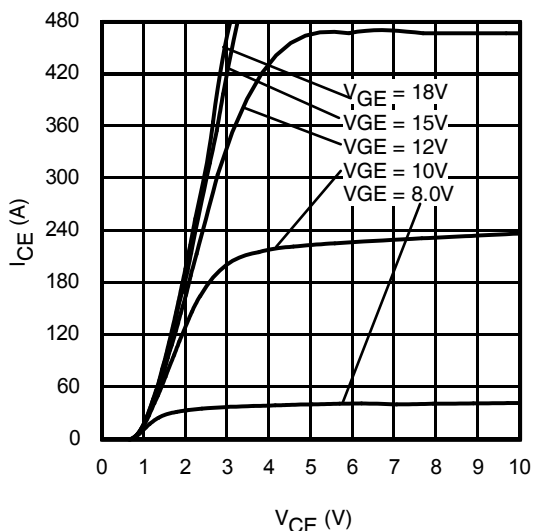
**Fig. 2** - Power Dissipation vs. Case Temperature



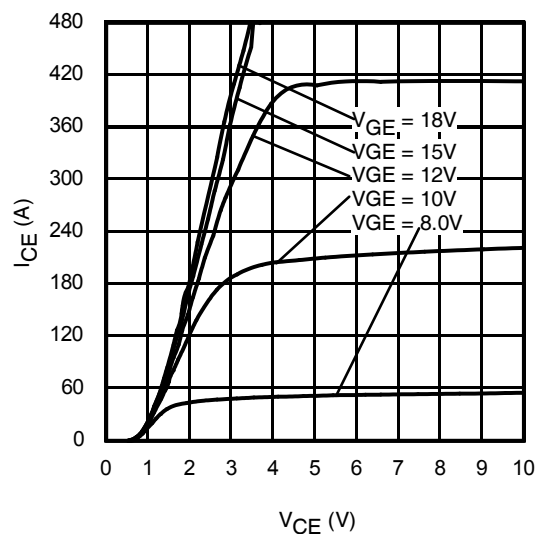
**Fig. 3** - Forward SOA  
 $T_C = 25^\circ\text{C}$ ,  $T_J \leq 175^\circ\text{C}$ ;  $V_{GE} = 15\text{V}$



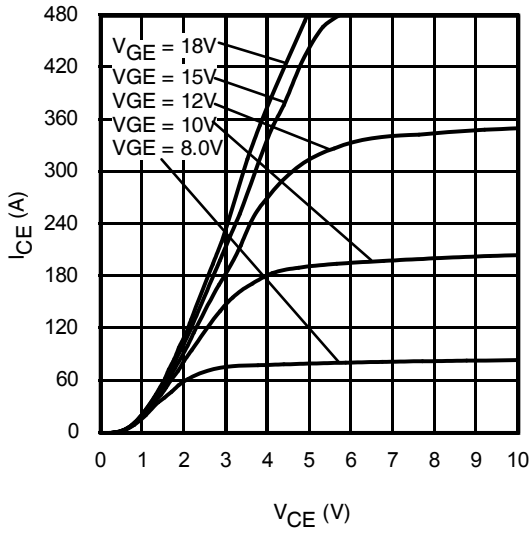
**Fig. 4** - Reverse Bias SOA  
 $T_J = 175^\circ\text{C}$ ;  $V_{GE} = 20\text{V}$



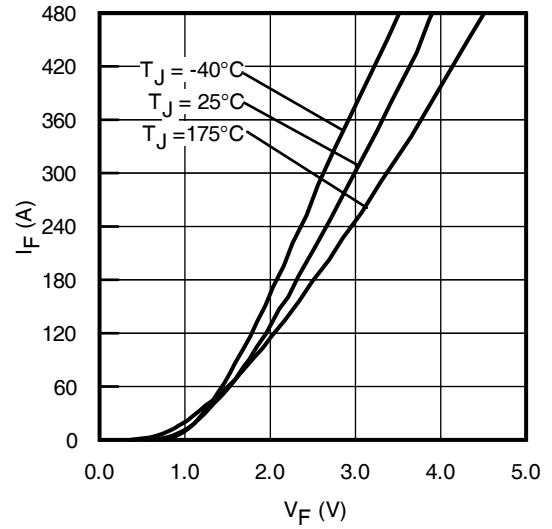
**Fig. 5** - Typ. IGBT Output Characteristics  
 $T_J = -40^\circ\text{C}$ ;  $t_p = 30\mu\text{s}$



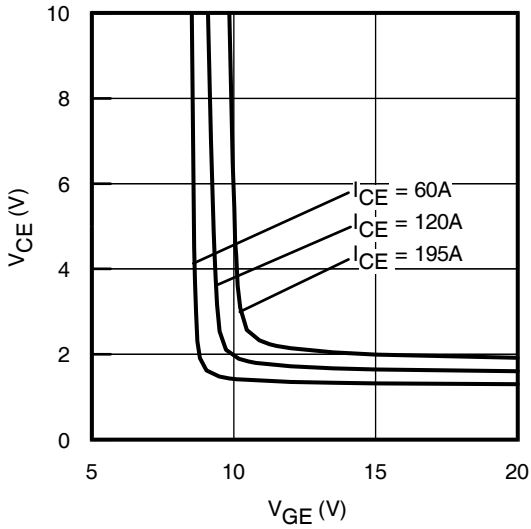
**Fig. 6** - Typ. IGBT Output Characteristics  
 $T_J = 25^\circ\text{C}$ ;  $t_p = 30\mu\text{s}$



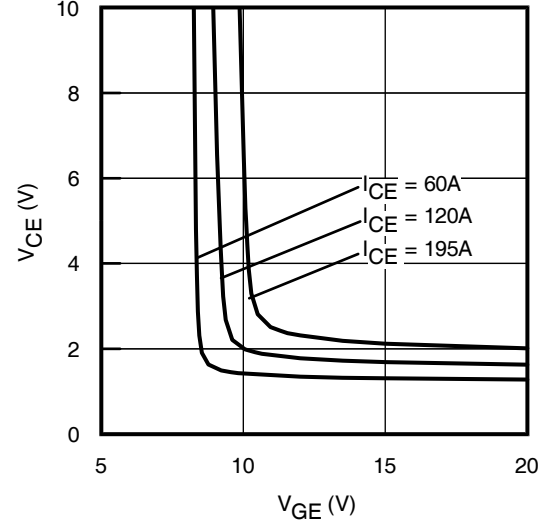
**Fig. 7 - Typ. IGBT Output Characteristics**  
 $T_J = 175^\circ\text{C}$ ;  $t_p = 30\mu\text{s}$



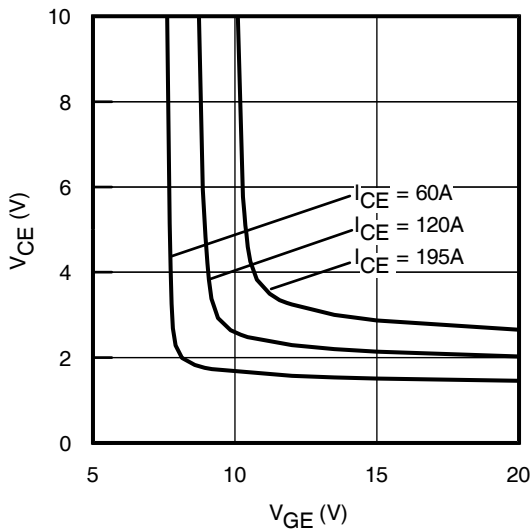
**Fig. 8 - Typ. Diode Forward Characteristics**  
 $t_p = 30\mu\text{s}$



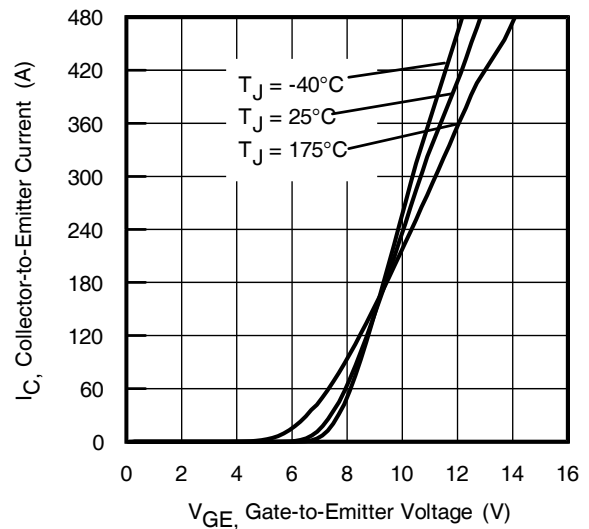
**Fig. 9 - Typical  $V_{CE}$  vs.  $V_{GE}$**   
 $T_J = -40^\circ\text{C}$



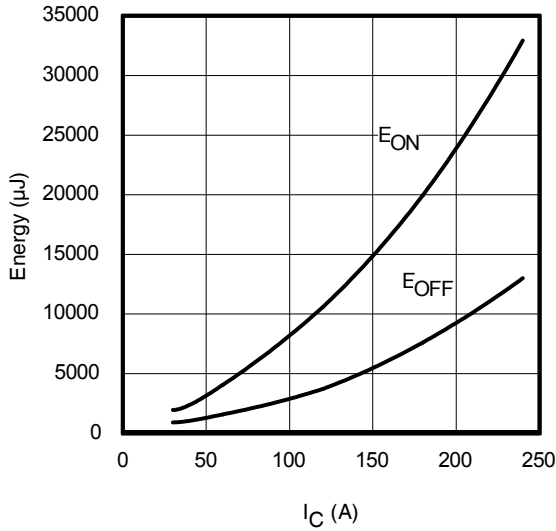
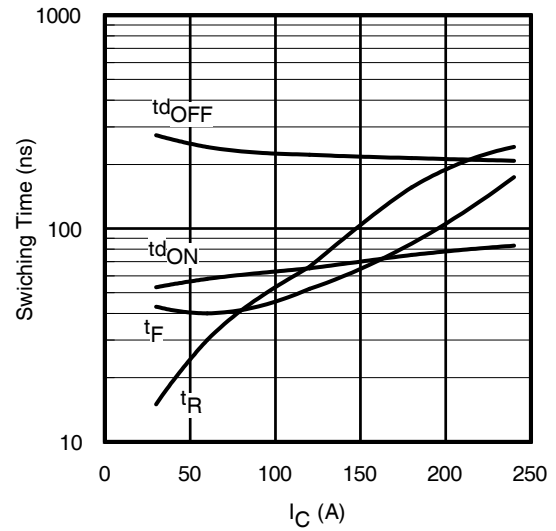
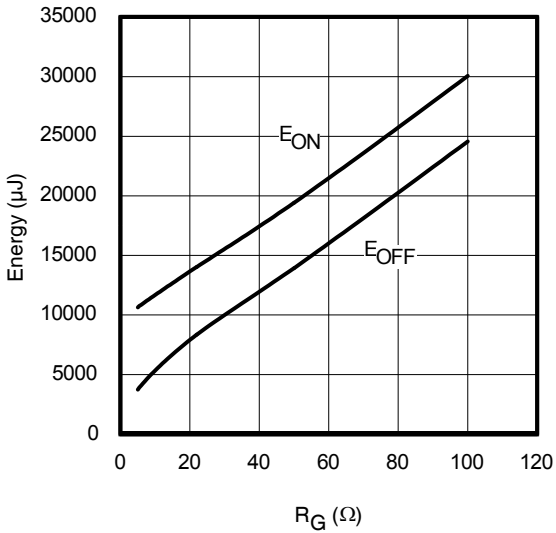
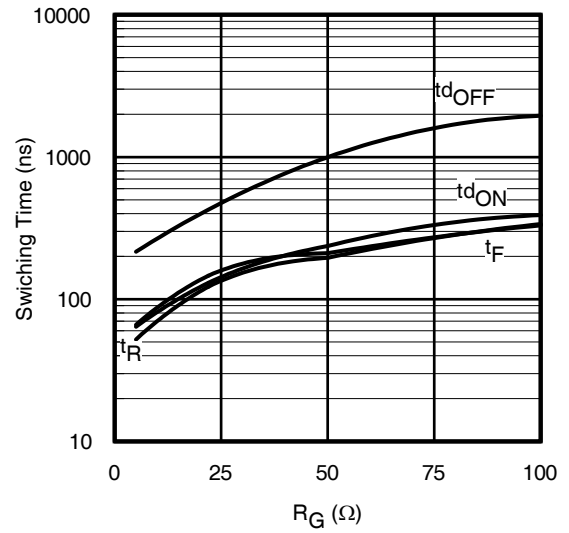
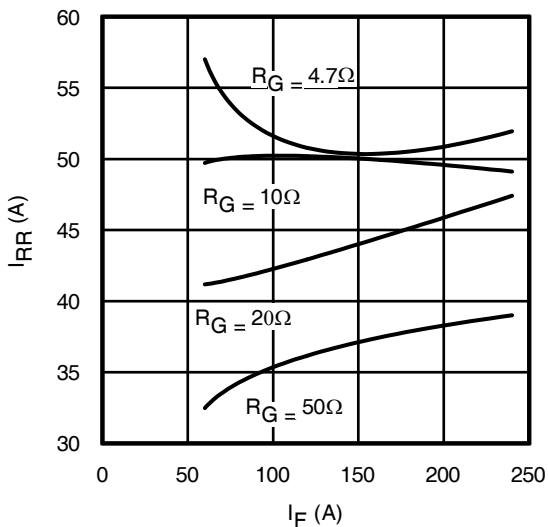
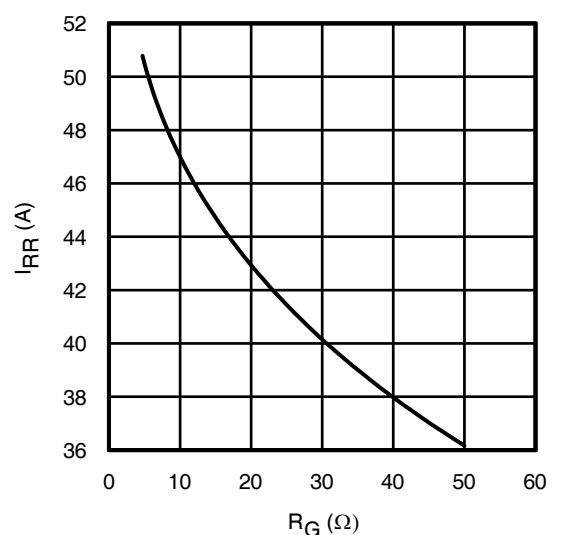
**Fig. 10 - Typical  $V_{CE}$  vs.  $V_{GE}$**   
 $T_J = 25^\circ\text{C}$

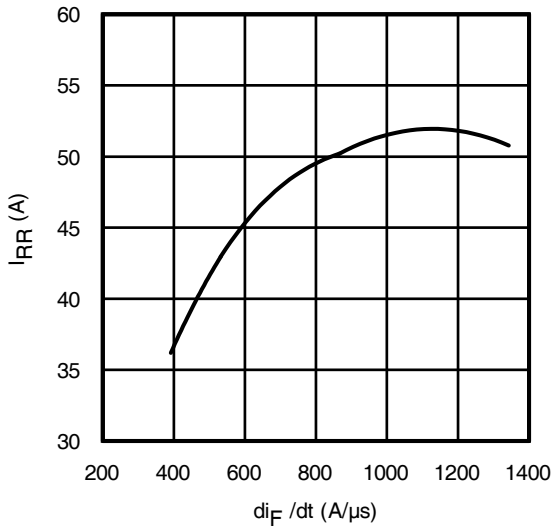


**Fig. 11 - Typical  $V_{CE}$  vs.  $V_{GE}$**   
 $T_J = 175^\circ\text{C}$

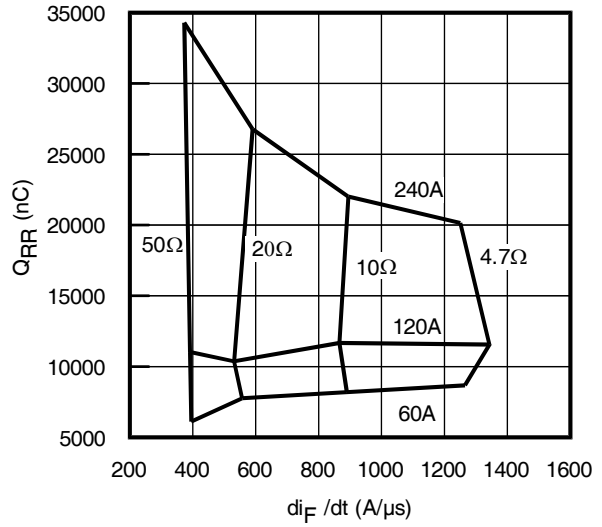


**Fig. 12 - Typ. Transfer Characteristics**  
 $V_{CE} = 50\text{V}$ ;  $t_p = 10\mu\text{s}$

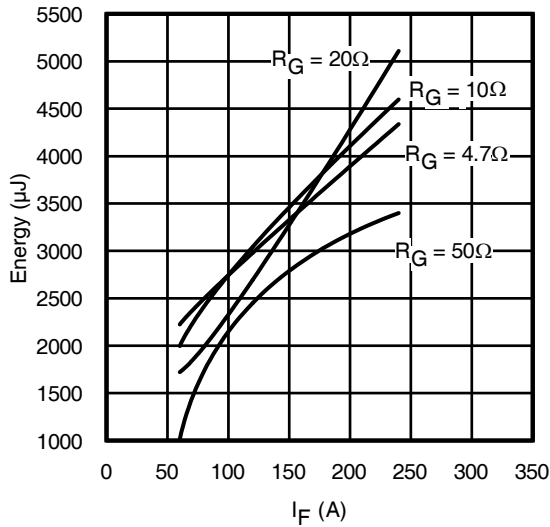

**Fig. 13 - Typ. Energy Loss vs.  $I_C$** 
 $T_J = 175^\circ\text{C}; L = 0.087\text{mH}; V_{CE} = 400\text{V}, R_G = 5.0\Omega; V_{GE} = 15\text{V}$ 

**Fig. 14 - Typ. Switching Loss vs.  $I_C$** 
 $T_J = 175^\circ\text{C}; L = 0.087\text{mH}; V_{CE} = 400\text{V}, R_G = 5.0\Omega; V_{GE} = 15\text{V}$ 

**Fig. 15 - Typ. Energy Loss vs.  $R_G$** 
 $T_J = 175^\circ\text{C}; L = 0.087\text{mH}; V_{CE} = 400\text{V}, I_{CE} = 120\text{A}; V_{GE} = 15\text{V}$ 

**Fig. 16 - Typ. Switching Time vs.  $R_G$** 
 $T_J = 175^\circ\text{C}; L = 0.087\text{mH}; V_{CE} = 400\text{V}, I_{CE} = 120\text{A}; V_{GE} = 15\text{V}$ 

**Fig. 17 - Typ. Diode  $I_{RR}$  vs.  $I_F$**   
 $T_J = 175^\circ\text{C}$ 

**Fig. 18 - Typ. Diode  $I_{RR}$  vs.  $R_G$**   
 $T_J = 175^\circ\text{C}$



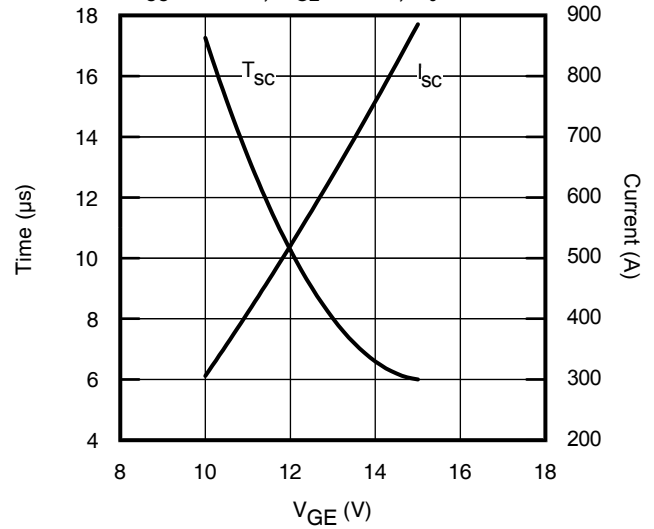
**Fig. 19** - Typ. Diode  $I_{RR}$  vs.  $diF/dt$   
 $V_{CC} = 400V$ ;  $V_{GE} = 15V$ ;  $I_F = 120A$ ;  $T_J = 175^\circ C$



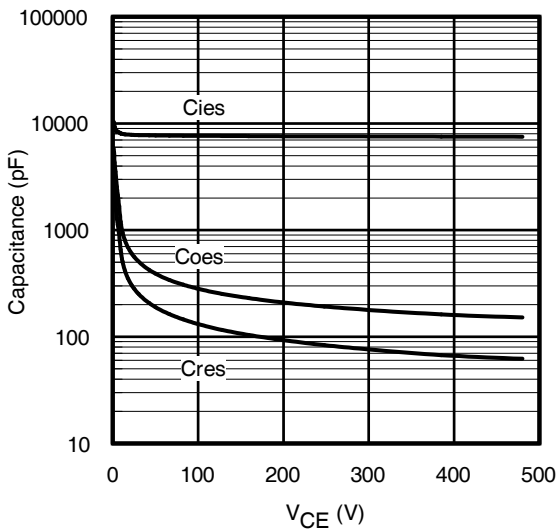
**Fig. 20** - Typ. Diode  $Q_{RR}$  vs.  $diF/dt$   
 $V_{CC} = 400V$ ;  $V_{GE} = 15V$ ;  $T_J = 175^\circ C$



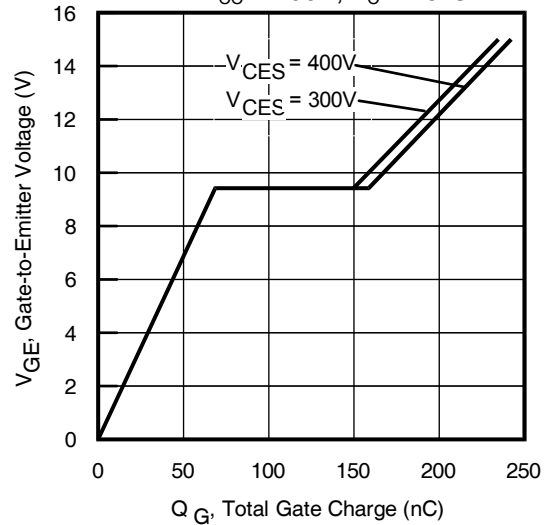
**Fig. 21** - Typ. Diode  $E_{RR}$  vs.  $I_F$   
 $T_J = 175^\circ C$



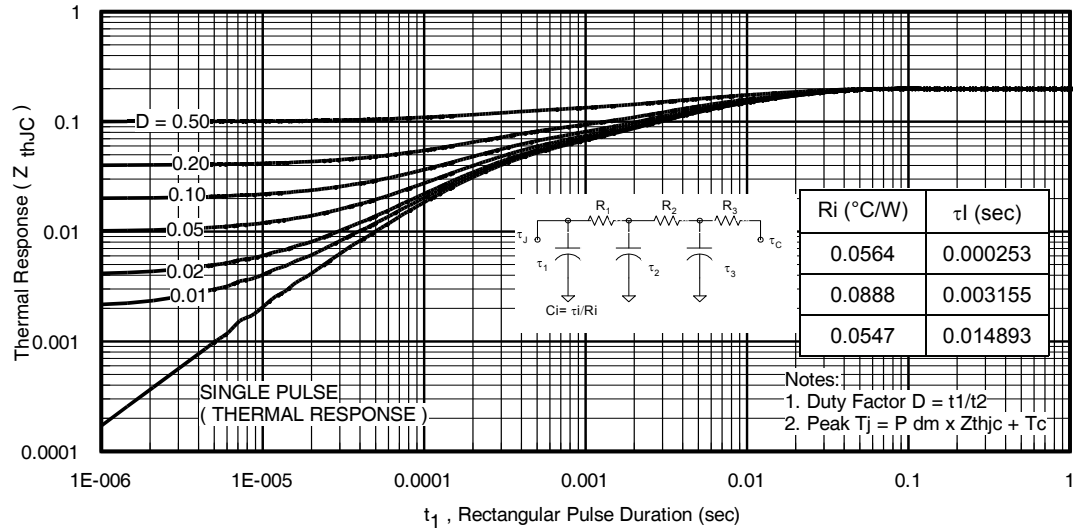
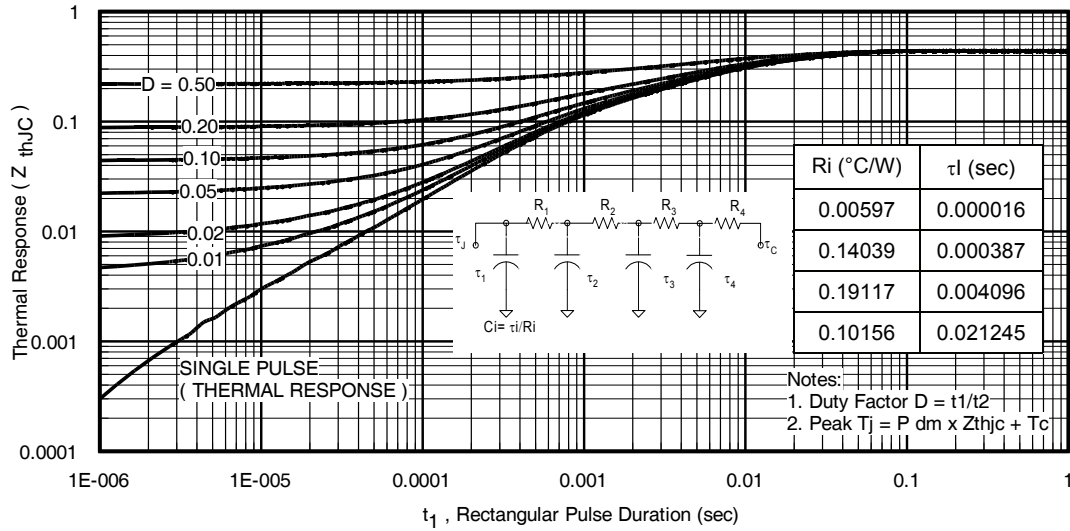
**Fig. 22** -  $V_{GE}$  vs. Short Circuit Time  
 $V_{CC} = 400V$ ;  $T_C = 25^\circ C$

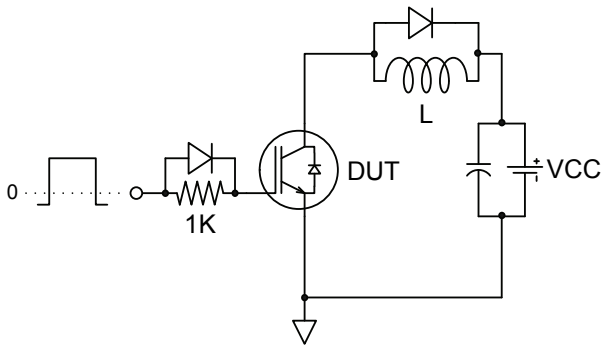


**Fig. 23** - Typ. Capacitance vs.  $V_{CE}$   
 $V_{GE} = 0V$ ;  $f = 1MHz$



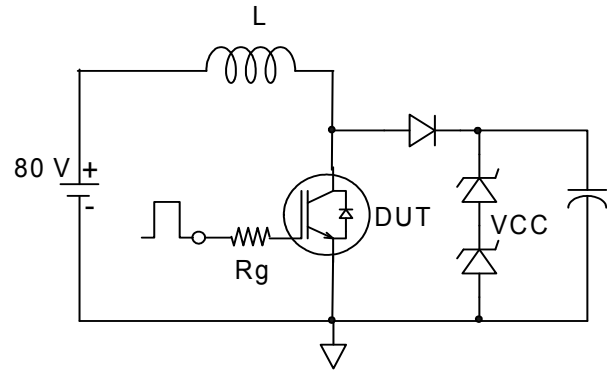
**Fig. 24** - Typical Gate Charge vs.  $V_{GE}$   
 $I_{CE} = 120A$


**Fig 25. Maximum Transient Thermal Impedance, Junction-to-Case (IGBT)**

**Fig 26. Maximum Transient Thermal Impedance, Junction-to-Case (DIODE)**



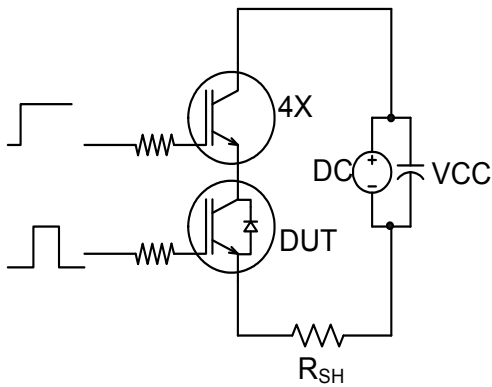
Gate Charge Circuit

**Fig.C.T.1** - Gate Charge Circuit (turn-off)

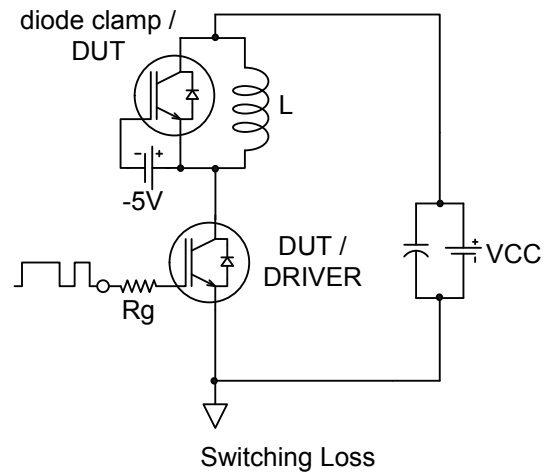


RBSOA Circuit

**Fig.C.T.2** - RBSOA Circuit

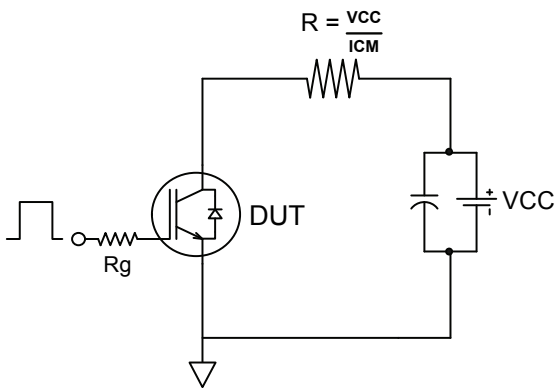


**Fig.C.T.3** - S.C. SOA Circuit

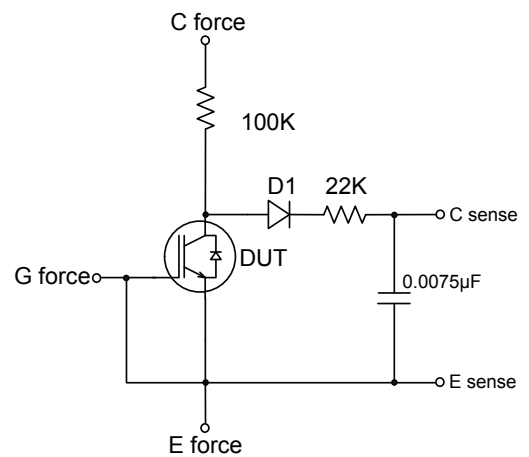


Switching Loss

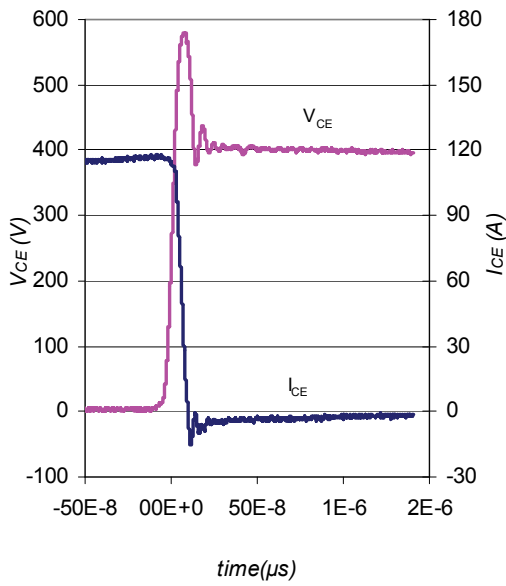
**Fig.C.T.4** - Switching Loss Circuit



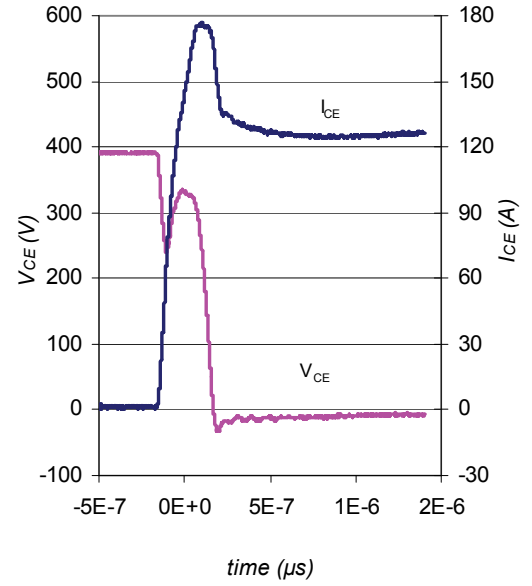
**Fig.C.T.5** - Resistive Load Circuit



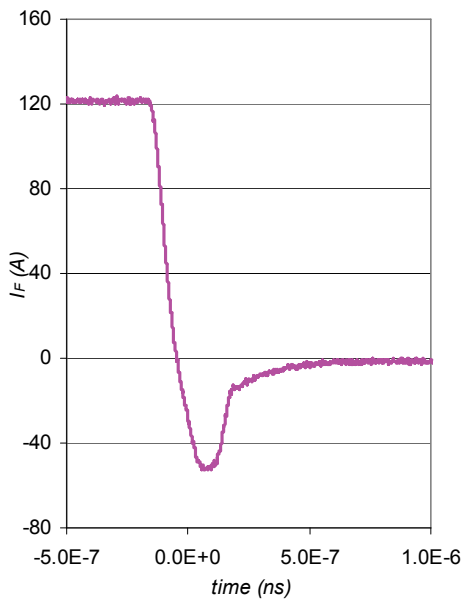
**Fig.C.T.6** - BVCEs Filter Circuit



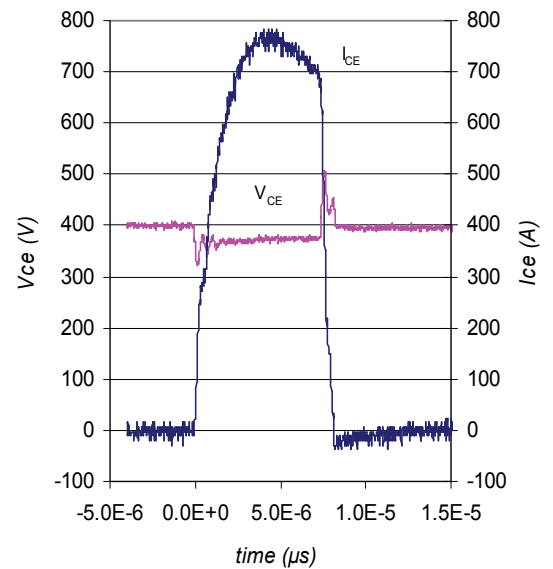
**Fig. WF1** - Typ. Turn-off Loss Waveform  
@  $T_J = 175^\circ\text{C}$  using Fig. CT.4



**Fig. WF2** - Typ. Turn-on Loss Waveform  
@  $T_J = 175^\circ\text{C}$  using Fig. CT.4

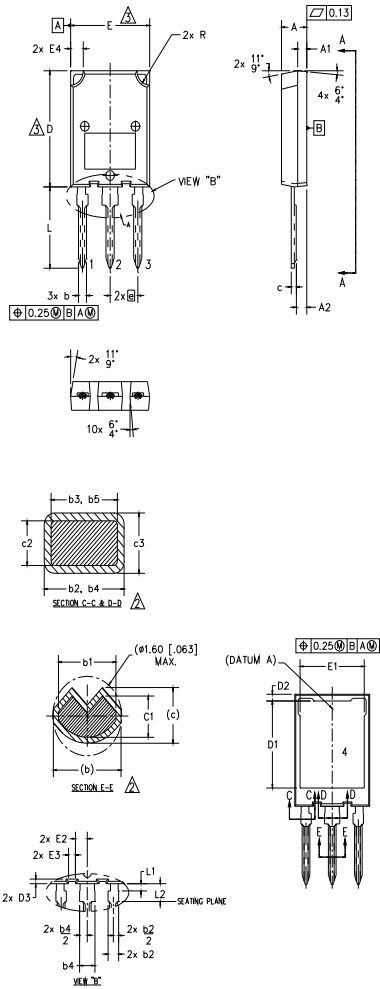


**Fig. WF3** - Typ. Diode Recovery Waveform  
@  $T_J = 175^\circ\text{C}$  using Fig. CT.4



**Fig. WF4** - Typ. S.C. Waveform  
@  $T_J = 25^\circ\text{C}$  using Fig. CT.3



**Case Outline and Dimensions-PG-TO274-3-903** Dimensions are shown in millimeters (inches)

**NOTES:**

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M-1994
2. DIMENSIONS b1, b3, b5, c1 & c3 APPLY TO BASE METAL ONLY.
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [0.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTER EXTREMES OF THE PLASTIC BODY.
- 4.- ALL DIMENSIONS SHOWN IN MILLIMETERS.
- 5.- CONTROLLING DIMENSION: MILLIMETER.
- 6.- OUTLINE CONFORMS TO JEDEC OUTLINE TO-274AA

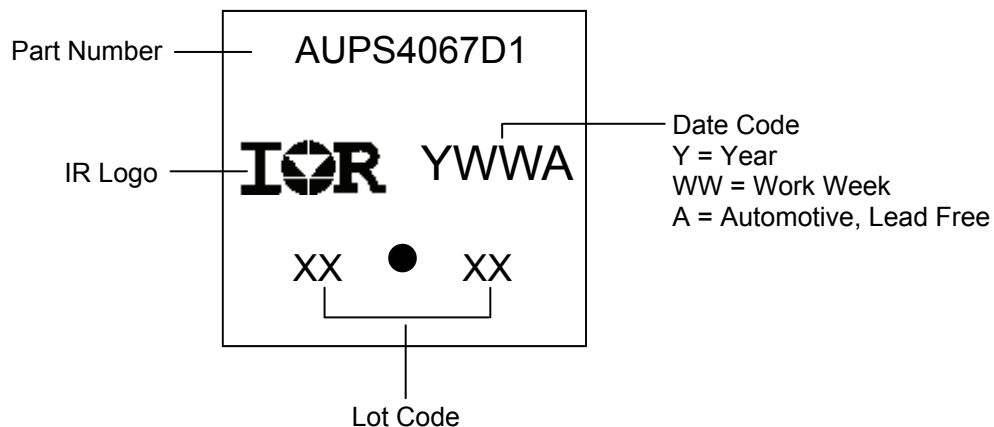
SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.50	5.50	.177	.217	
A1	1.45	2.15	.057	.085	
A2	1.65	2.35	.065	.093	
b	1.45	1.60	.054	.063	
b1	1.40	1.50	.055	.059	2
b2	2.00	2.40	.079	.094	
b3	1.95	2.35	.077	.093	2
b4	3.00	3.15	.118	.124	
b5	2.95	3.35	.116	.132	2
c	1.10	1.30	.043	.051	
c1	0.90	1.10	.035	.043	2
c2	0.65	0.85	.026	.033	
c3	0.50	0.70	.020	.028	2
D	19.80	20.80	.780	.819	3
D1	15.50	16.10	.610	.634	
D2	0.70	1.30	.028	.051	
D3	0.75	1.25	.030	.049	
E	15.10	16.10	.594	.634	3
E1	13.30	13.90	.524	.547	
E2	2.25	2.70	.089	.109	
E3	1.20	1.70	.047	.067	
E4	2.00	3.00	.079	.118	
e	5.45 BSC		.215 BSC		
L	13.80	14.80	.535	.583	
L1	1.00	1.60	.039	.063	
L2	3.85	4.25	.152	.167	
R	2.00	3.00	.079	.118	

**LEAD ASSIGNMENTS**
**MOSFET**

- 1.- GATE
- 2.- DRAIN
- 3.- SOURCE
- 4.- DRAIN

**IGBT**

- 1.- GATE
- 2.- COLLECTOR
- 3.- EMITTER
- 4.- COLLECTOR

**PG-TO274-3-903 -Part Marking Information**


**Qualification Information**

<b>Qualification Level</b>	Automotive (per AEC-Q101)	
	This part number(s) passed Automotive qualification. Infineon's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
<b>Moisture Sensitivity Level</b>	PG-TO274-3-903	N/A
<b>ESD</b>	Machine Model	Class M4(+/- 400) <sup>†</sup> AEC-Q101-002
	Human Body Model	Class H3B(+/- 8000) <sup>†</sup> AEC-Q101-001
	Charged Device Model	Class C5 (+/- 1000) <sup>†</sup> AEC-Q101-005
<b>RoHS Compliant</b>	Yes	

† Highest passing voltage.

**Revision History**

Date	Comments
07/19/2018	<ul style="list-style-type: none"> <li>Updated datasheet with corporate template.</li> <li>Corrected the reference of "SUPER-247" to "PG-TO274-3-903" to align with IFX nomenclature on pages 1,10,11.</li> </ul>

**Published by**

**Infineon Technologies AG**  
81726 München, Germany

© Infineon Technologies AG 2015

All Rights Reserved.

**IMPORTANT NOTICE**

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics ("Beschaffenheitsgarantie"). With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer's compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Infineon Technologies in customer's applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer's technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office ([www.infineon.com](http://www.infineon.com)).

**WARNINGS**

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies' products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Infineon:](#)

[AUIRGPS4067D1](#)