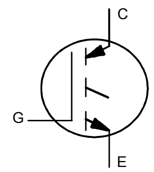
Features

- Low $V_{CE\ (on)}$ Planar IGBT Technology
- Low Switching Losses
- Square RBSOA
- 100% of the Parts Tested for ILM
- Positive $V_{CE\ (on)}$ Temperature Coefficient
- Reflow Capable per JDSD22-A113
- Lead-Free, RoHS Compliant
- Automotive Qualified *



n-channel

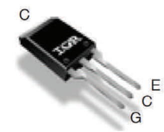
V_{CES} = 1200V

I_C = 81A @ T_C = 100°C

$V_{CE(on)}$ typ. = 1.47V @ 33A

Benefits

- Device optimized for soft switching applications
- High Efficiency due to Low $V_{CE(on)}$, low switching losses
- Rugged transient performance for increased reliability
- Excellent current sharing in parallel operation
- Low EMI



Super-TO-220
AUIRGDC0250

G	C	E
Gate	Collector	Emitter

Application

- PTC Heater
- Relay Replacement

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
AUIRGDC0250	Super-TO-220	Tube	50	AUIRGDC0250

Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Ratings” may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (T_A) is 25°C, unless otherwise specified.

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	1200	V
I_C @ T_C = 25°C	Continuous Collector Current	141④	A
I_C @ T_C = 100°C	Continuous Collector Current	81	
I_{CM}	Pulse Collector Current, V_{GE} = 15V ②	99	
I_{LM}	Clamped Inductive Load Current, V_{GE} = 20V ①	99	
V_{GE}	Continuous Gate-to-Emitter Voltage	±20	V
	Transient Gate-to-Emitter Voltage	±30	
P_D @ T_C = 25°C	Maximum Power Dissipation	543	W
P_D @ T_C = 100°C	Maximum Power Dissipation	217	
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	°C
	Soldering Temperature, for 10 sec. (Through Hole Mounting)	300 (0.063 in. (1.6mm) from case)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$ (IGBT)	Thermal Resistance Junction-to-Case (each IGBT) ③	——	0.23	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink (flat, greased surface)	0.50	——	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (typical socket mount)	——	62	

* Qualification standards can be found at www.infineon.com

Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	1200	—	—	V	V_{GE} = 0V, I_C = 250μA
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	1.2	—	V/°C	V_{GE} = 0V, I_C = 1mA (25°C-150°C)
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	1.47	1.8	V	I_C = 33A, V_{GE} = 15V, T_J = 25°C
		—	1.45	—		I_C = 33A, V_{GE} = 15V, T_J = 150°C
$V_{GE(th)}$	Gate Threshold Voltage	3.0	—	6.0	V	V_{CE} = V_{GE}, I_C = 250μA
$\Delta V_{GE(th)}/\Delta TJ$	Threshold Voltage temp. coefficient	—	-15	—	mV/°C	V_{CE} = V_{GE}, I_C = 250μA (25°C-150°C)
gfe	Forward Transconductance	—	30	—	S	V_{CE} = 50V, I_C = 33A,PW = 20μS
I_{CES}	Collector-to-Emitter Leakage Current	—	—	250	μA	V_{GE} = 0V, V_{CE} = 1200V, T_J = 25°C
		—	—	1000		V_{GE} = 0V, V_{CE} = 1200V,T_J = 150°C
I_{GES}	Gate-to-Emitter Leakage Current	—	—	±100	nA	V_{GE} = ±20V

Switching Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge (turn-on)	—	151	227	nC	I_C = 33A
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	26	39		V_{GE} = 15V
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	62	93		V_{CC} = 600V
E_{off}	Turn-Off Switching Loss	—	15	16	mJ	I_C = 33A, V_{CC} = 600V, V_{GE} = 15V
$t_{d(off)}$	Turn-Off delay time	—	485	616	ns	R_G = 5Ω, L = 400μH, T_J = 25°C
t_f	Fall time	—	1193	1371		Energy losses include tail
E_{off}	Turn-Off Switching Loss	—	29	—	mJ	I_C = 33A, V_{CC} = 600V, V_{GE} = 15V
$t_{d(off)}$	Turn-Off delay time	—	689	—	ns	R_G = 5Ω, L = 400μH, T_J = 150°C
t_f	Fall time	—	2462	—		Energy losses include tail
C_{ies}	Input Capacitance	—	3804	—	pF	V_{GE} = 0V
C_{oes}	Output Capacitance	—	161	—		V_{CC} = 30V
C_{res}	Reverse Transfer Capacitance	—	31	—		f = 1.0Mhz
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T_J = 150°C, I_C = 99A V_{CC} = 960V, Vp ≤ 1200V Rg = 5Ω, V_{GE} = +20V to 0V

Notes:

① V_{CC} = 80% (V_{CES}), V_{GE} = 20V, L = 400μH, R_G = 5Ω.
② Pulse width limited by max. junction temperature.
③ R_θ is measured at T_J approximately 90°C.
④ Calculated continuous current based on maximum allowable junction temperature. Bond wire current limit is 78A. Note that current limitations arising from heating of the device leads may occur with some lead mounting arrangements.

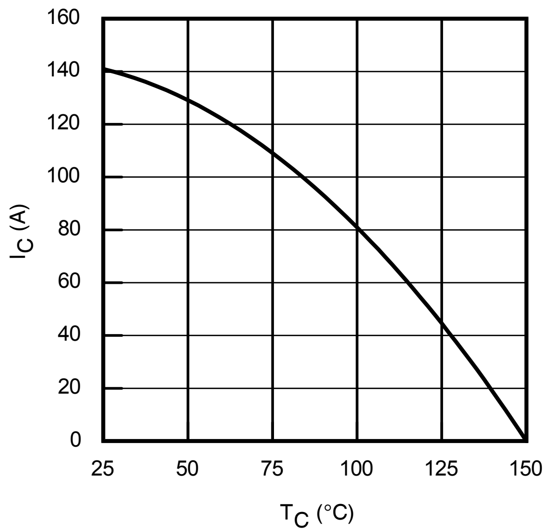


Fig. 1 - Maximum DC Collector Current vs. Case Temperature

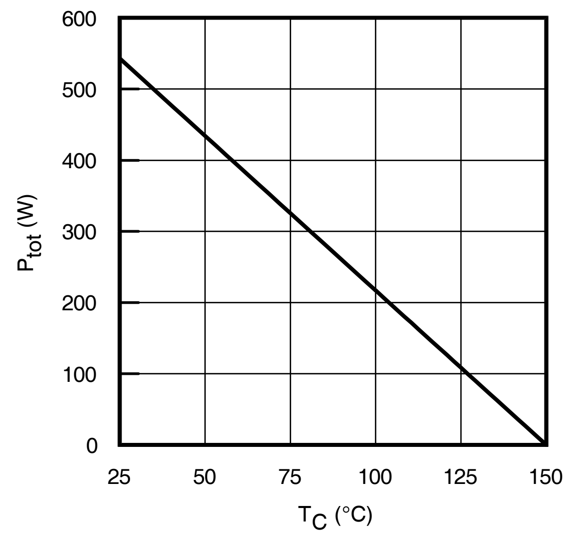


Fig. 2 - Power Dissipation vs. Case Temperature

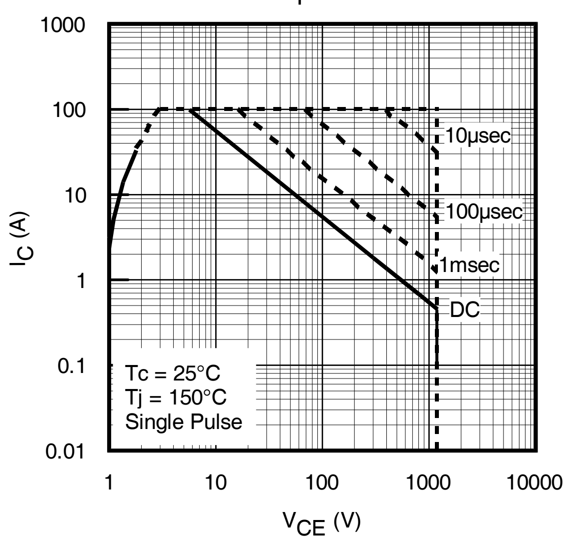


Fig. 3 - Forward SOA
T_C = 25°C, $T_J \leq$ 150°C; V_{GE} =15V

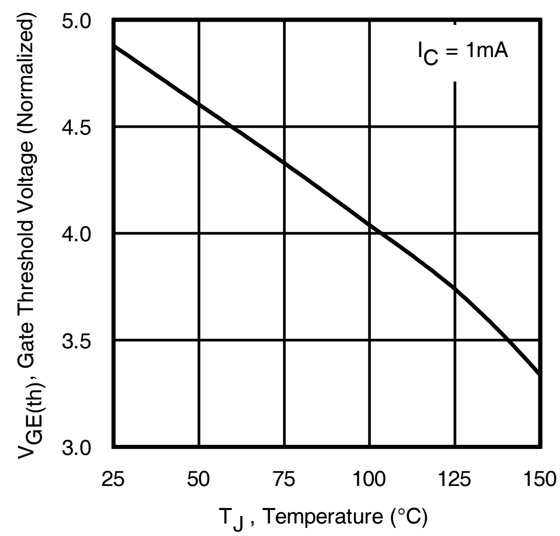


Fig. 4 - Typical Gate Threshold Voltage (Normalized) vs. Junction Temperature

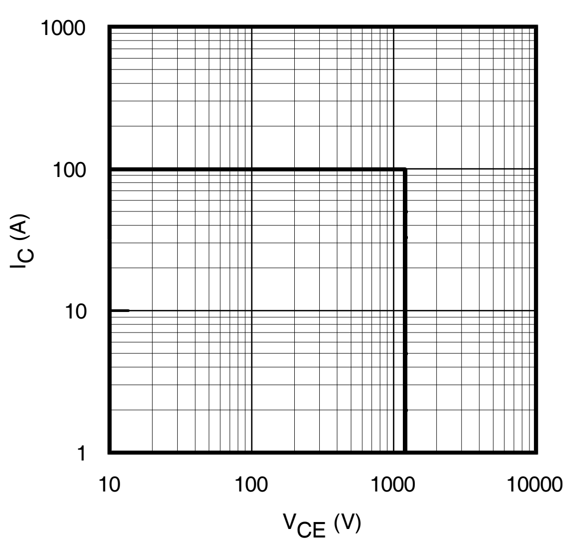


Fig. 5 - Reverse Bias SOA
T_J = 150°C; V_{GE} = 20V

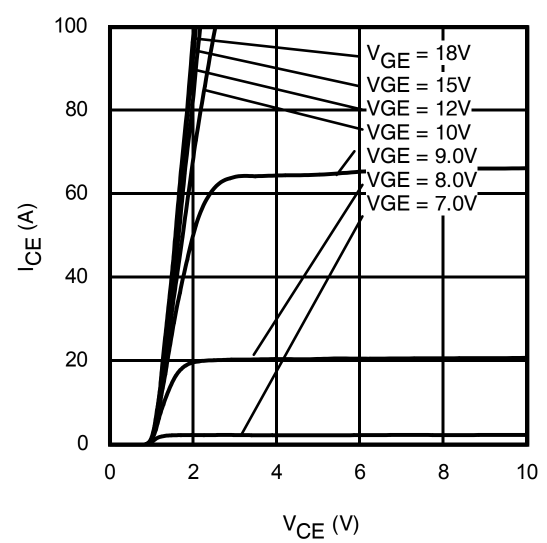


Fig. 6 - Typ. IGBT Output Characteristics
T_J = -40°C; tp = 20µs

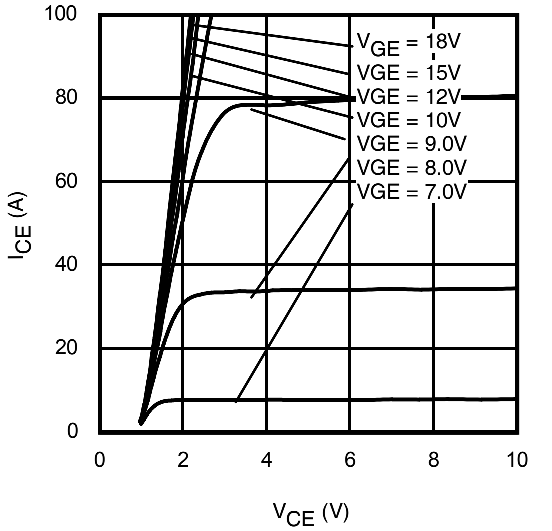


Fig. 7 - Typ. IGBT Output Characteristics
TJ = 25°C; tp =20μs

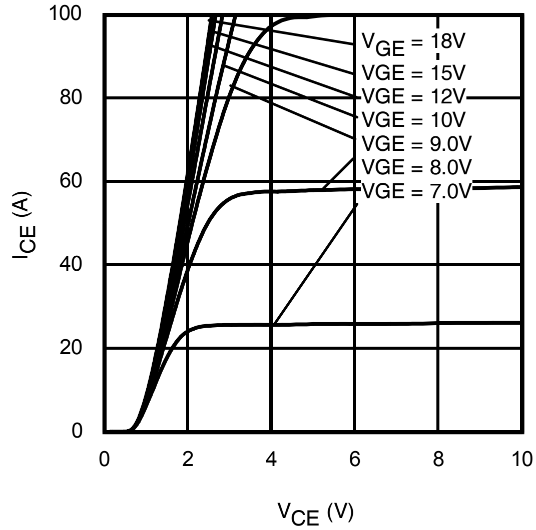


Fig. 8 - Typ. IGBT Output Characteristics
TJ = 150°C; tp = 20μs

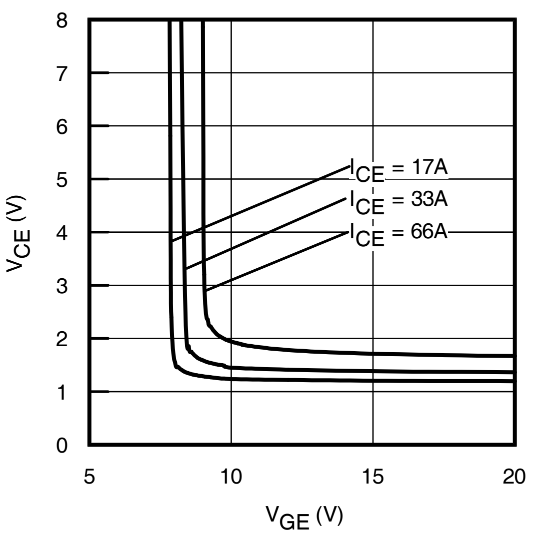


Fig. 9 - Typical V_{CE} vs. V_{GE}
T_J = -40°C

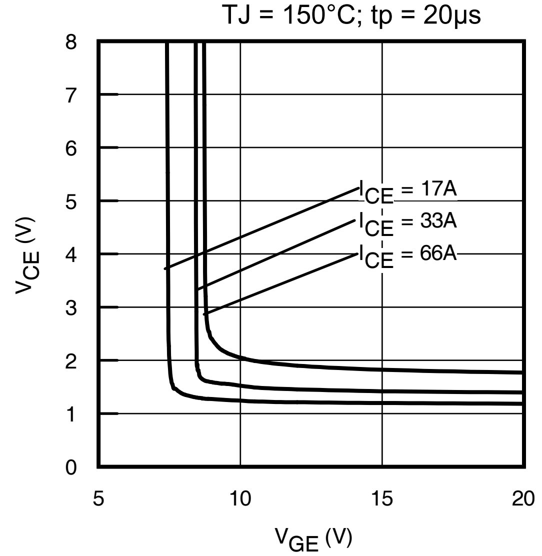


Fig. 10 - Typical V_{CE} vs. V_{GE}
T_J = 25°C

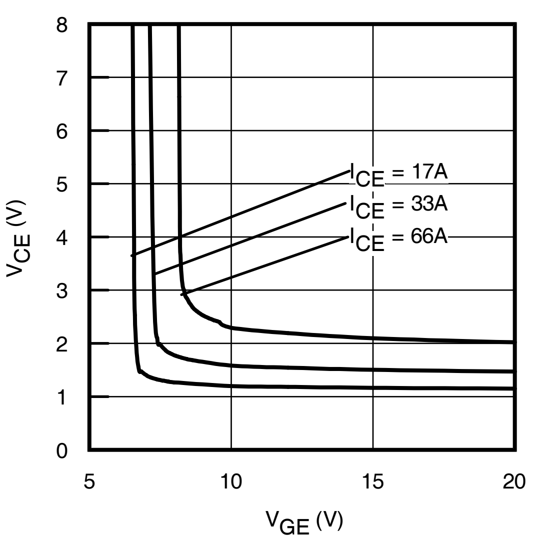


Fig. 11 - Typical V_{CE} vs. V_{GE}
T_J = 150°C

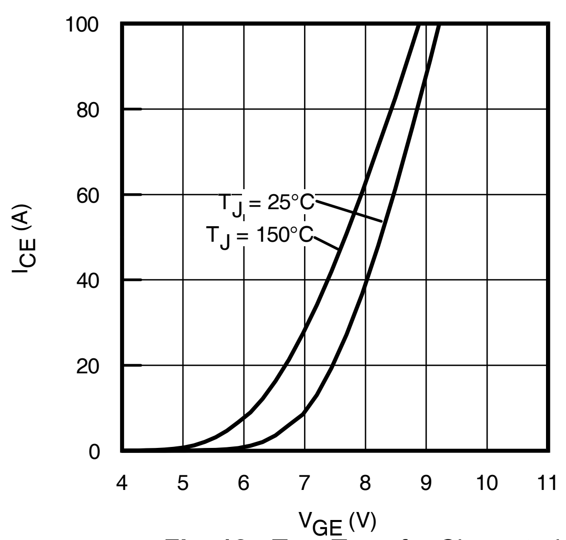


Fig. 12 - Typ. Transfer Characteristics
VCE = 50V; tp = 20μs

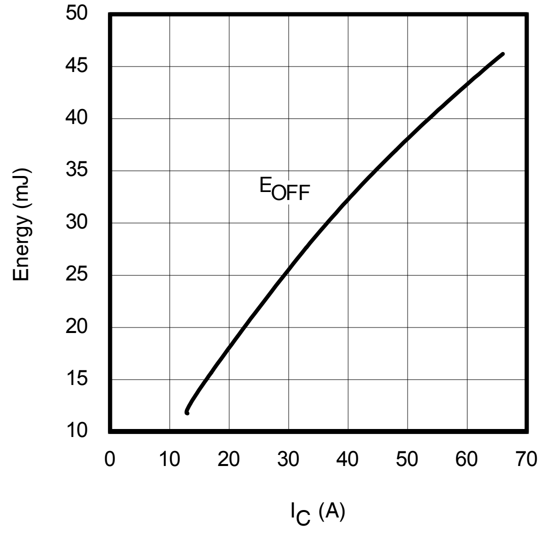


Fig. 13 - Typ. Energy Loss vs. I_C
T_J = 150°C; L = 400µH; V_{CE} = 600V, R_G = 5Ω; V_{GE} = 15V

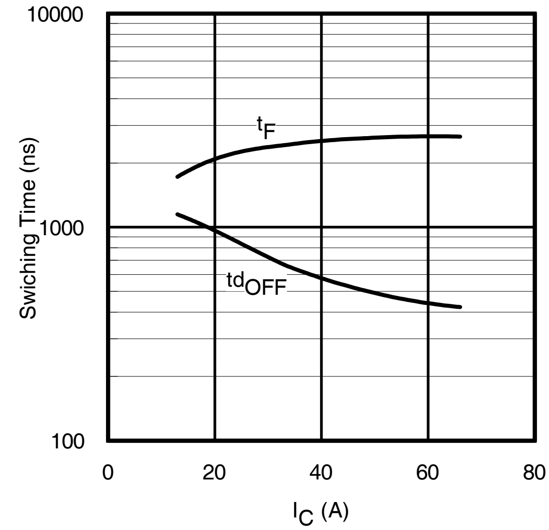


Fig. 14 - Typ. Switching Time vs. I_C
T_J = 150°C; L = 400µH; V_{CE} = 600V, R_G = 5Ω; V_{GE} = 15V

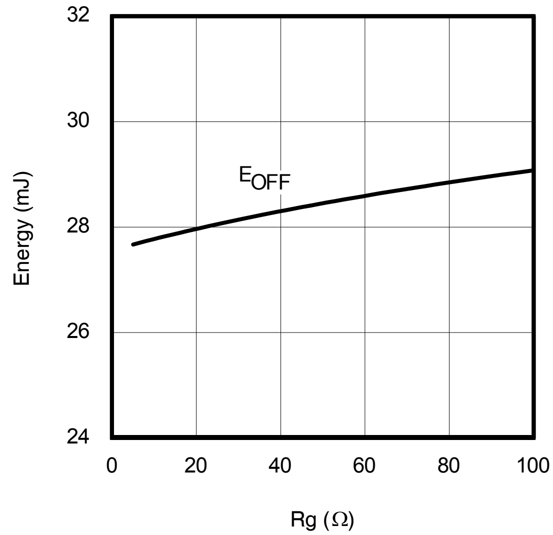


Fig. 15 - Typ. Energy Loss vs. R_G
T_J = 150°C; L = 400µH; V_{CE} = 600V, I_{CE} = 33A; V_{GE} = 15V

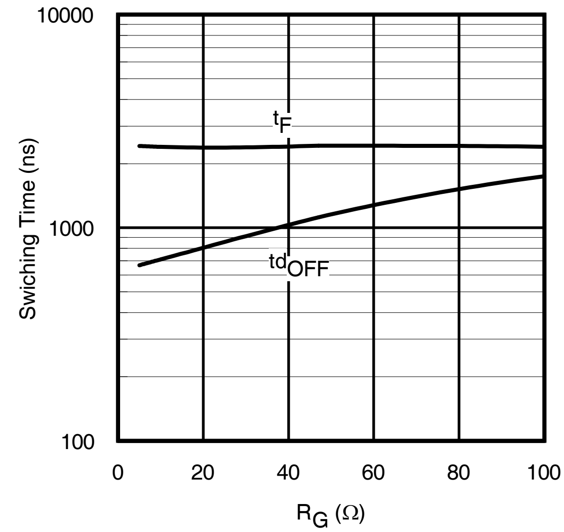


Fig. 16 - Typ. Energy Loss vs. R_G
T_J = 150°C; L = 400µH; V_{CE} = 600V, I_{CE} = 33A; V_{GE} = 15V

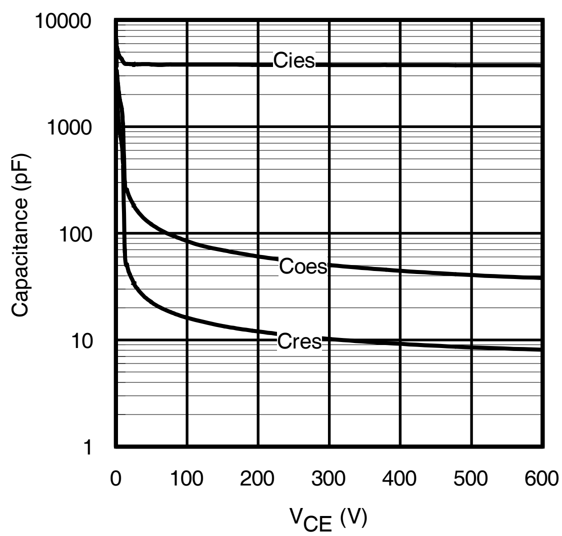


Fig. 17 - Typ. Capacitance vs. V_{CE}
V_{GE}= 0V; f = 1MHz

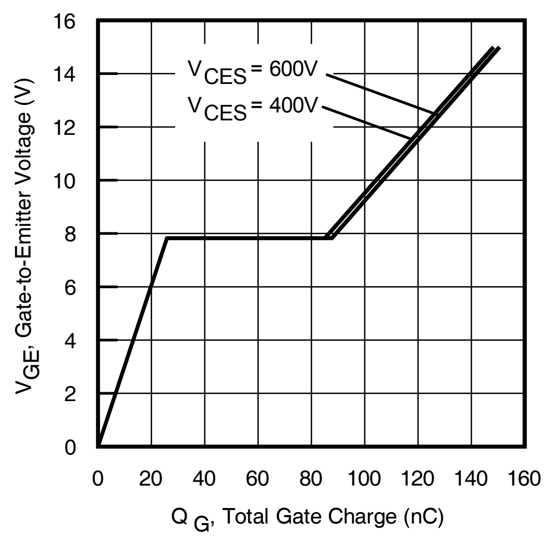


Fig. 18 - Typical Gate Charge vs. V_{GE}
I_{CE} = 33A; L = 2.0mH

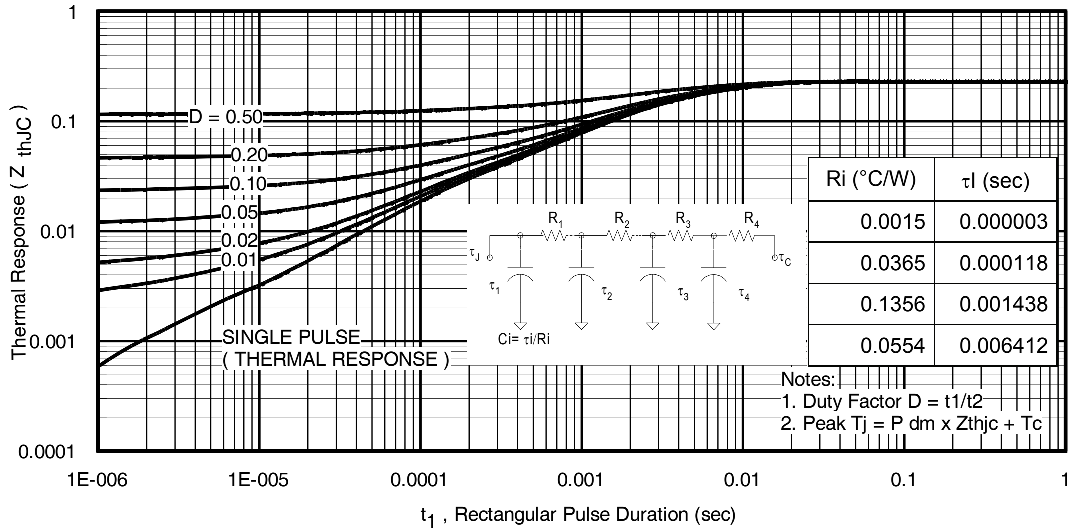


Fig 19. Maximum Transient Thermal Impedance, Junction-to-Case (IGBT)

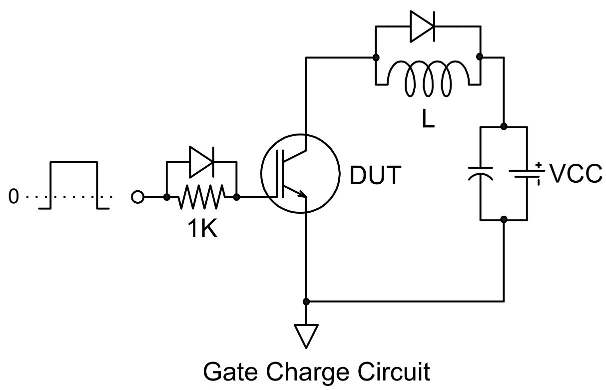


Fig.C.T.1 - Gate Charge Circuit (turn-off)

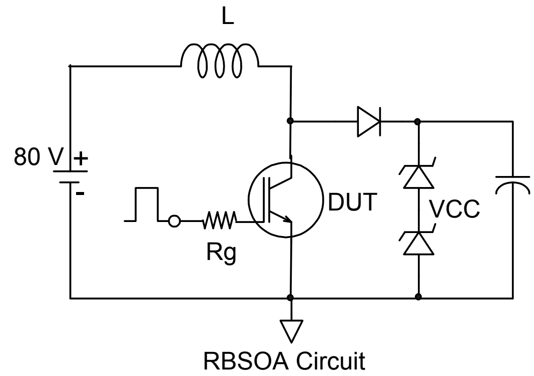


Fig.C.T.2 - RBSOA Circuit

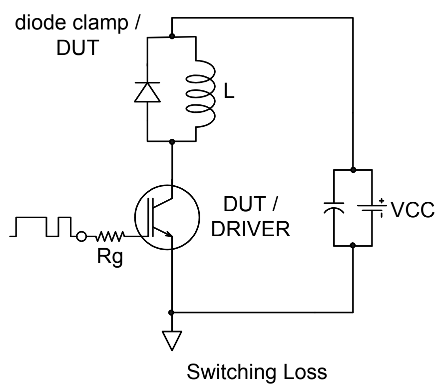


Fig.C.T.3 - Switching Loss Circuit

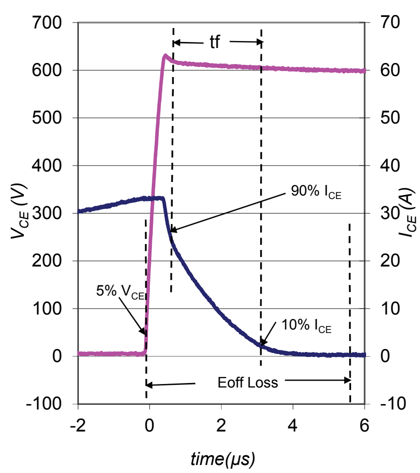
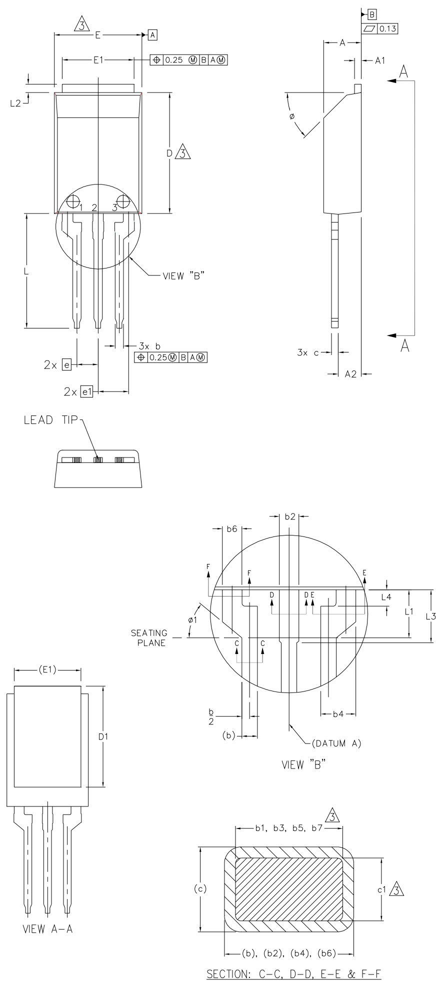


Fig. WF1 - Typ. Turn-off Loss Waveform
@ T_J = 150°C using Fig. CT.3

Super-TO-220 Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M-1994
2. DIMENSIONS b1, b3, b5 & c1 APPLY TO BASE METAL ONLY.
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.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-273AA.

SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.34	4.74	.171	.187	
A1	0.50	1.00	.020	.039	
A2	2.50	3.00	.098	.118	
b	0.90	1.30	.035	.051	
b1	0.80	1.10	.031	.043	2
b2	1.25	1.65	.049	.065	
b3	1.10	1.55	.043	.061	2
b4	2.35	2.55	.093	.100	
b5	2.30	2.50	.091	.098	2
b6	1.25	1.65	.049	.065	
b7	1.10	1.55	.043	.061	2
c	0.70	1.00	.028	.039	
c1	0.60	0.90	.024	.035	2
D	14.00	15.00	.0551	.591	3
D1	12.50	13.50	.492	.531	
E	10.00	11.00	.394	.433	3
E1	8.00	9.00	.315	.354	
e	2.55 BSC		.100 BSC		
e1	3.66 BSC		.144 BSC		
L	13.00	14.50	.512	.571	
L1	3.00	3.50	.118	.138	
L2	0.50	1.50	.020	.059	
L3	3.50	4.00	.138	.157	
L4	–	1.50	–	.059	
ø	42.5°	47.5°	42.5°	47.5°	
ø1	–	42.5°	–	42.5°	

LEAD ASSIGNMENTS

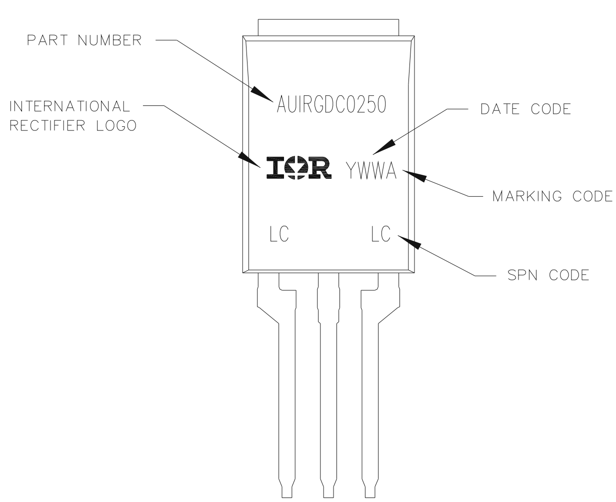
MOSFET

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

IGBT

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

Super-TO-220 Part Marking Information



Qualification Information

Qualification Level		Automotive (per AEC-Q101)	
		Comments: This part number (s) passed Automotive qualification. Infineon's Industrial and Consumer qualification level is granted by extension of the higher Automotive level.	
Moisture Sensitivity Level		3L– Super TO-220	MSL1
ESD	Machine Model	Class M4† (+/- 800V) AEC-Q101-002	
	Human Body Model	Class H3A† (+/- 6000V) AEC-Q101-001	
	Charged Device Model	Class C5† (+/- 2000V) AEC-Q101-005	
RoHS Compliant		Yes	

† Highest passing voltage.

Revision History

Revision	Date	Subjects (major changes since last revision)
2.0	9/2/2014	• Final Datasheet
2.1	12/1/2014	• Updated with $V_{(BR)CES}$ and $V_{GE(th)}$ conditions
2.2	3/2/2015	• Updated with minor changes
2.3	8/31/2017	• Updated with Infineon logo
2.4	03/01/2018	• Updated with qualification level
2.5	11/06/2018	• Updated maximum $V_{CE(on)}$

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