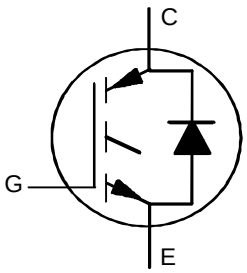
International
IOR Rectifier

IRG7PH35UD1MPbF

INSULATED GATE BIPOLAR TRANSISTOR WITH ULTRA-LOW VF DIODE FOR INDUCTION HEATING AND SOFT SWITCHING APPLICATIONS

Features

- Low $V_{CE\ (ON)}$ trench IGBT Technology
- Low Switching Losses
- Square RBSOA
- Ultra-Low V_F Diode
- 1300Vpk Repetitive Transient Capacity
- 100% of the Parts Tested for I_{LM} ①
- Positive $V_{CE\ (ON)}$ Temperature Co-Efficient
- Tight Parameter Distribution
- Lead Free Package



n-channel

V_{CES} = 1200V

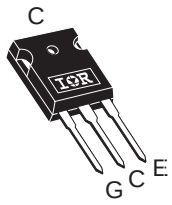
I_C = 25A, T_C = 100°C

$T_{J(max)}$ = 150°C

$V_{CE(on)}$ typ. = 1.9V @ I_C = 20A

Benefits

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



TO-247AD

G	C	E
Gate	Collector	Emitter

Base part number	Package Type	Standard Pack		Orderable part number
		Form	Quantity	
IRG7PH35UD1MPbF	TO-247AD	Tube	25	IRG7PH35UD1MPbF

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	1200	V
$V_{(BR)Transient}$	Repetitive Transient Collector-to-Emitter Voltage ⑥	1300	
I_C @ T_C = 25°C	Continuous Collector Current	50	A
I_C @ T_C = 100°C	Continuous Collector Current	25	
I_{CM}	Pulse Collector Current, V_{GE}=15V ②⑤	150	
I_{LM}	Clamped Inductive Load Current, V_{GE}=20V ①	80	
I_F @ T_C = 25°C	Diode Continous Forward Current	50	
I_F @ T_C = 100°C	Diode Continous Forward Current	25	
I_{FM}	Diode Maximum Forward Current ②	80	
V_{GE}	Continuous Gate-to-Emitter Voltage	±30	V
P_D @ T_C = 25°C	Maximum Power Dissipation	179	W
P_D @ T_C = 100°C	Maximum Power Dissipation	71	
T_J	Operating Junction and	-55 to +150	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 sec.	300 (0.063 in. (1.6mm) from case)	
	Mounting Torque, 6-32 or M3 Screw	10 lbf·in (1.1 N·m)	

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$ (IGBT)	Thermal Resistance Junction-to-Case-(each IGBT)④	—	—	0.70	°C/W
$R_{\theta JC}$ (Diode)	Thermal Resistance Junction-to-Case-(each Diode) ④	—	—	1.35	
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink (flat, greased surface)	—	0.24	—	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (typical socket mount)	—	40	—	

 © 2013 International Rectifier

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 = 100µA ③
$\Delta V_{(BR)CES}/\Delta T_J$	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	—	1.9	2.2	V	I_C = 20A, V_{GE} = 15V, T_J = 25°C
		—	2.3	—		I_C = 20A, V_{GE} = 15V, T_J = 150°C
$V_{GE(th)}$	Gate Threshold Voltage	3.0	—	6.0	V	V_{CE} = V_{GE}, I_C = 600µA
gfe	Forward Transconductance	—	22	—	S	V_{CE} = 50V, I_C = 20A, PW = 30µs
I_{CES}	Collector-to-Emitter Leakage Current	—	1.0	100	µA	V_{GE} = 0V, V_{CE} = 1200V
		—	120	—		V_{GE} = 0V, V_{CE} = 1200V, T_J = 150°C
V_{FM}	Diode Forward Voltage Drop	—	1.15	1.26	V	I_F = 20A
		—	1.08	—		I_F = 20A, T_J = 150°C
I_{GES}	Gate-to-Emitter Leakage Current	—	—	±100	nA	V_{GE} = ±30V

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge (turn-on)	—	85	130	nC	I_C = 20A
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	15	20		V_{GE} = 15V
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	35	50		V_{CC} = 600V
E_{off}	Turn-Off Switching Loss	—	620	850	µJ	I_C = 20A, V_{CC} = 600V, V_{GE} = 15V R_G = 10Ω, L = 200µH,L_S = 150nH, T_J = 25°C Energy losses include tail
$t_{d(off)}$	Turn-Off delay time	—	160	180	ns	I_C = 20A, V_{CC} = 600V, V_{GE} = 15V
t_f	Fall time	—	80	105		R_G = 10Ω, L = 200µH,L_S = 150nH, T_J = 25°C
E_{off}	Turn-Off Switching Loss	—	1120	—	µJ	I_C = 20A, V_{CC} = 600V, V_{GE}=15V R_G = 10Ω, L = 200µH,L_S = 150nH, T_J = 150°C Energy losses include tail
$t_{d(off)}$	Turn-Off delay time	—	190	—	ns	I_C = 20A, V_{CC} = 600V, V_{GE} = 15V
t_f	Fall time	—	210	—		R_G = 10Ω, L = 200µH,L_S = 150nH, T_J = 150°C
C_{ies}	Input Capacitance	—	1940	—	pF	V_{GE} = 0V
C_{oes}	Output Capacitance	—	120	—		V_{CC} = 30V
C_{res}	Reverse Transfer Capacitance	—	40	—		f = 1.0Mhz
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T_J = 150°C, I_C = 80A V_{CC} = 960V, Vp =1200V Rg = 10Ω, V_{GE} = +20V to 0V

Notes:

① V_{CC} = 80% (V_{CES}), V_{GE} = 20V, R_G = 10Ω.
② Pulse width limited by max. junction temperature.
③ Refer to AN-1086 for guidelines for measuring $V_{(BR)CES}$ safely.
④ R_θ is measured at T_J approximately 90°C.
⑤ FBSOA operating conditions only.
⑥ V_{GE} = 0V, T_J = 75°C, PW ≤ 10µs.

 © 2012 International Rectifier

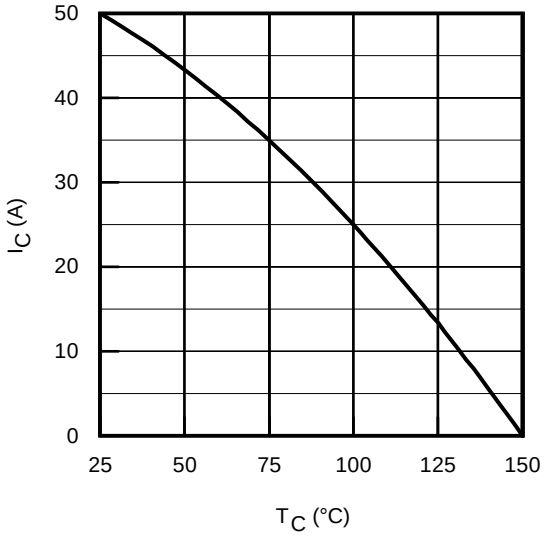


Fig. 1 - Maximum DC Collector Current vs. Case Temperature

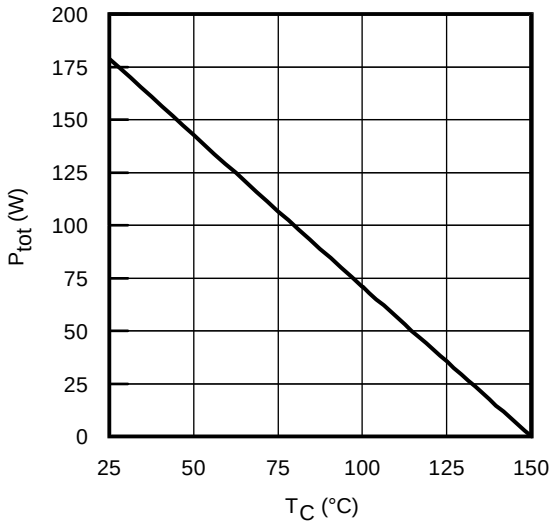


Fig. 2 - Power Dissipation vs. Case Temperature

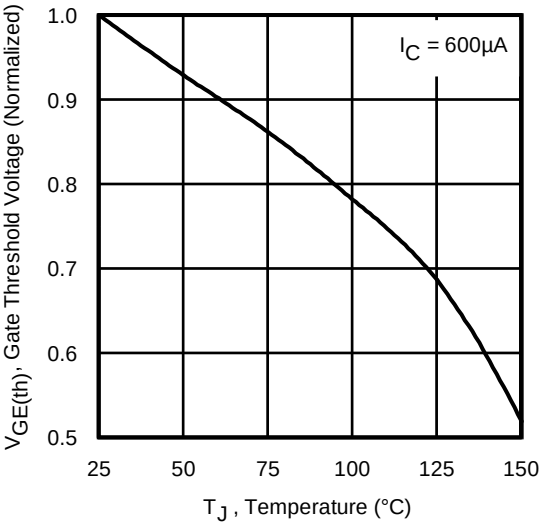


Fig. 3 - Typical Gate Threshold Voltage (Normalized) vs. Junction Temperature

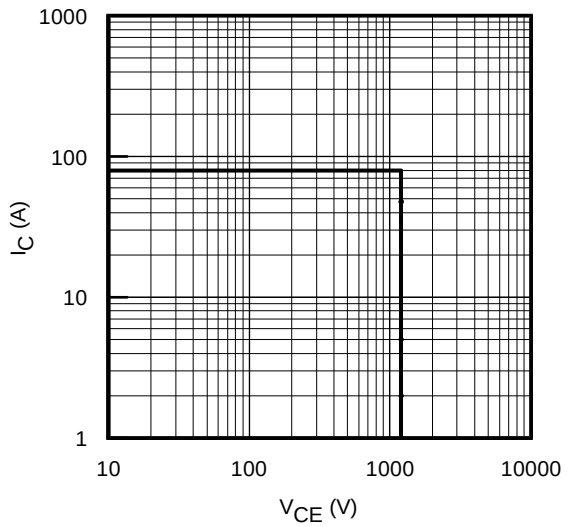


Fig. 4 - Reverse Bias SOA
T_J = 150°C; V_{GE} = 20V

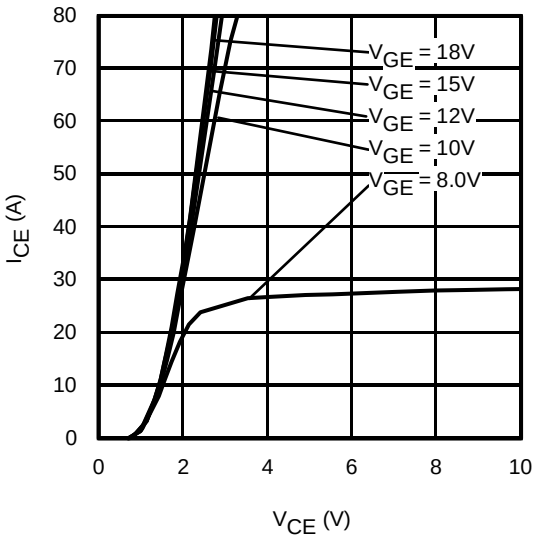


Fig. 5 - Typ. IGBT Output Characteristics
T_J = -40°C; tp = 30µs

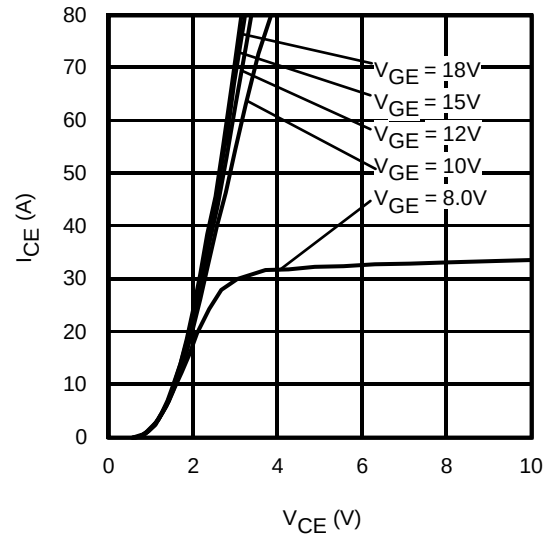


Fig. 6 - Typ. IGBT Output Characteristics
T_J = 25°C; tp = 30µs

 © 2012 International Rectifier

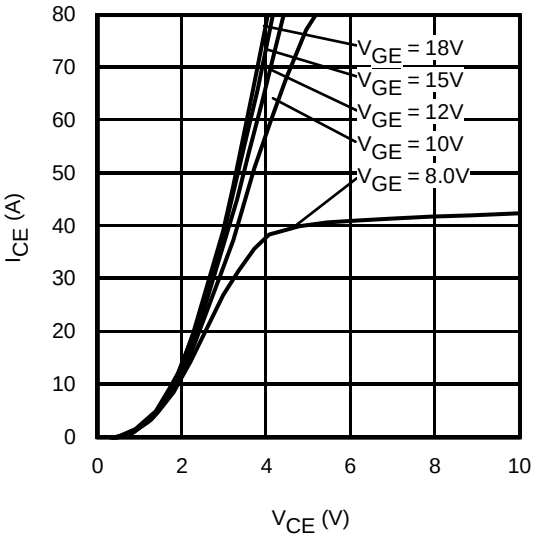


Fig. 7 - Typ. IGBT Output Characteristics
T_J = 150°C; tp = 30µs

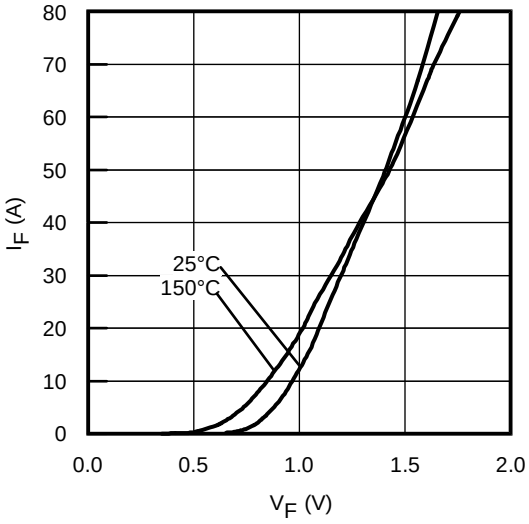


Fig. 8 - Typ. Diode Forward Voltage Drop Characteristics

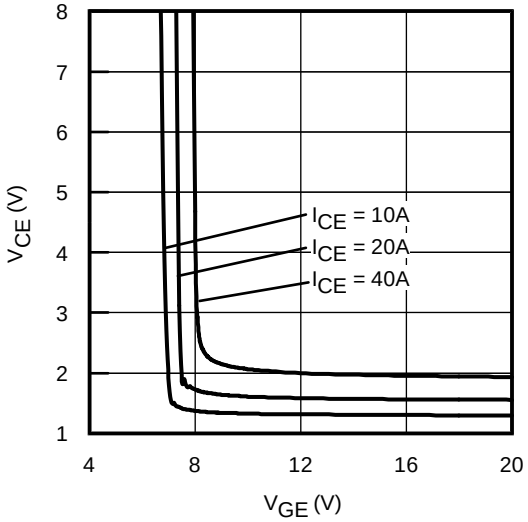


Fig. 9 - Typical V_{CE} vs. V_{GE}
T_J = -40°C

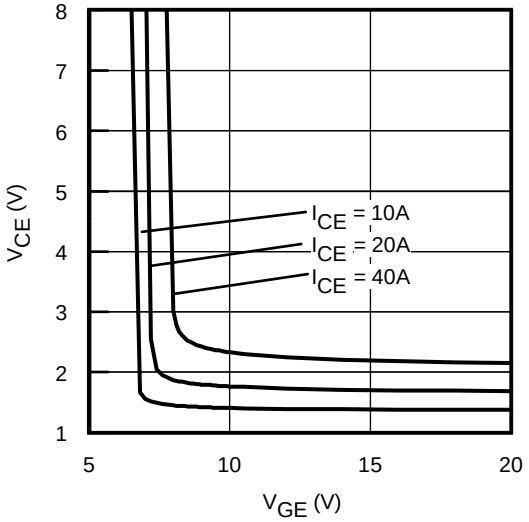


Fig. 10 - Typical V_{CE} vs. V_{GE}
T_J = 25°C

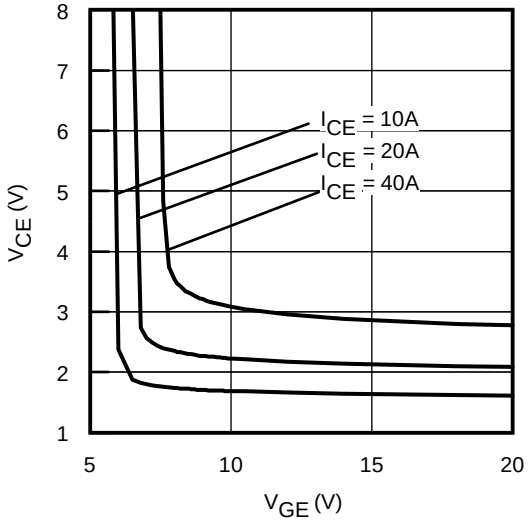


Fig. 11 - Typical V_{CE} vs. V_{GE}
T_J = 150°C

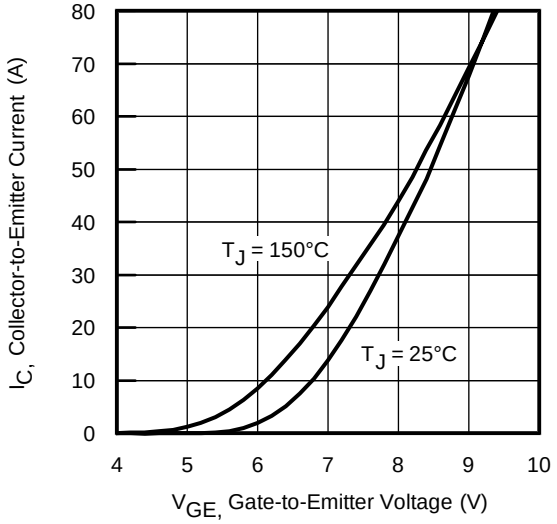


Fig. 12 - Typ. Transfer Characteristics
V_{CE} = 50V; tp = 30µs

 © 2012 International Rectifier

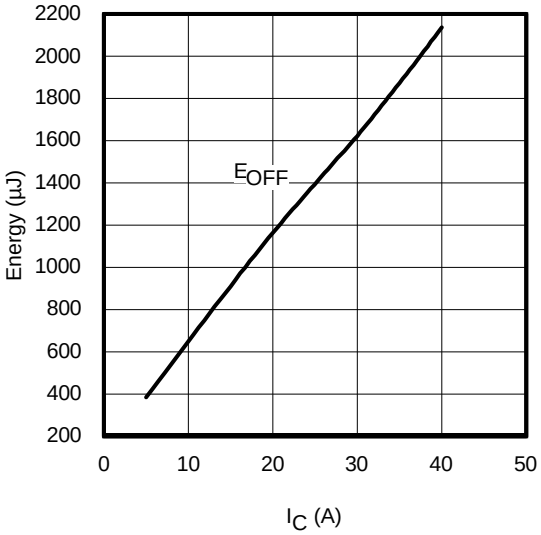


Fig. 13 - Typ. Energy Loss vs. I_C
T_J = 150°C; L = 680µH; V_{CE} = 600V, R_G = 10Ω; V_{GE} = 15V

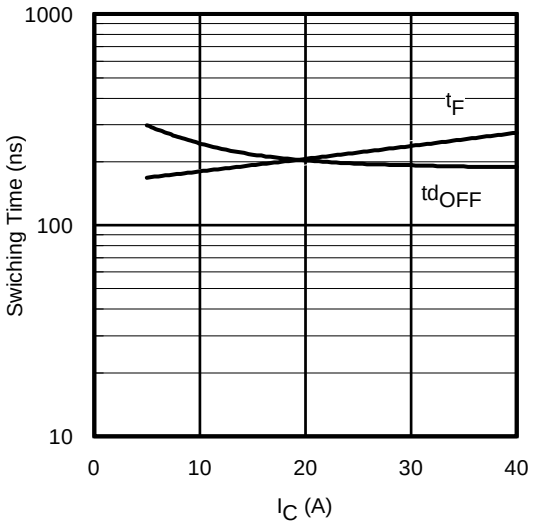


Fig. 14 - Typ. Switching Time vs. I_C
T_J = 150°C; L = 680µH; V_{CE} = 600V, R_G = 10Ω; V_{GE} = 15V

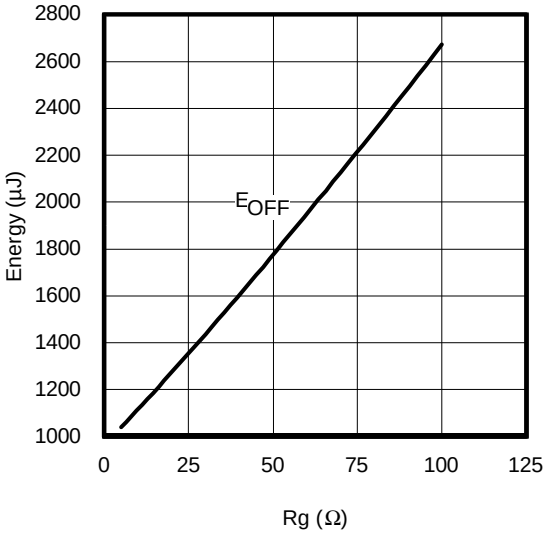


Fig. 15 - Typ. Energy Loss vs. R_G
T_J = 150°C; L = 680µH; V_{CE} = 600V, I_{CE} = 20A; V_{GE} = 15V

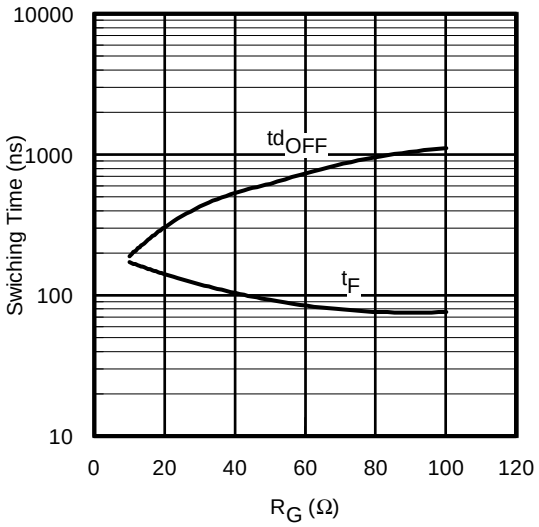


Fig. 16 - Typ. Switching Time vs. R_G
T_J = 150°C; L = 680µH; V_{CE} = 600V, I_{CE} = 20A; V_{GE} = 15V

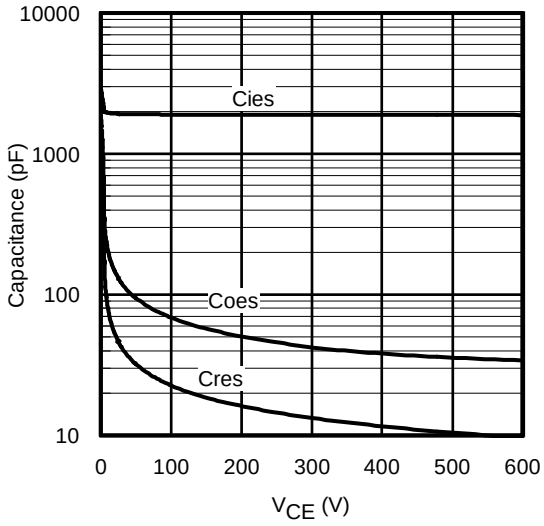


Fig. 17 - Typ. Capacitance vs. V_{CE}
V_{GE}= 0V; f = 1MHz

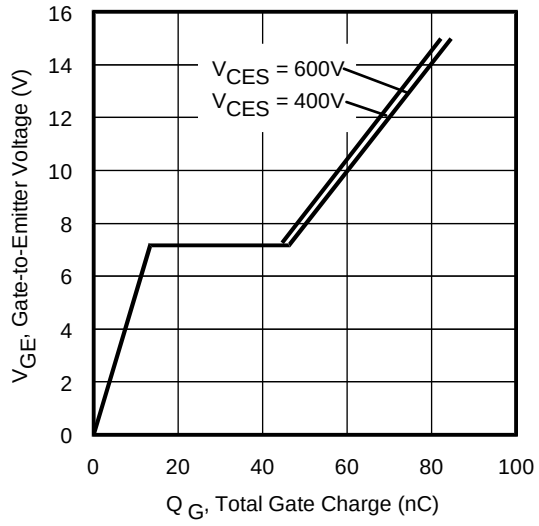


Fig. 18 - Typical Gate Charge vs. V_{GE}
I_{CE} = 20A; L = 2.4mH

 © 2012 International Rectifier

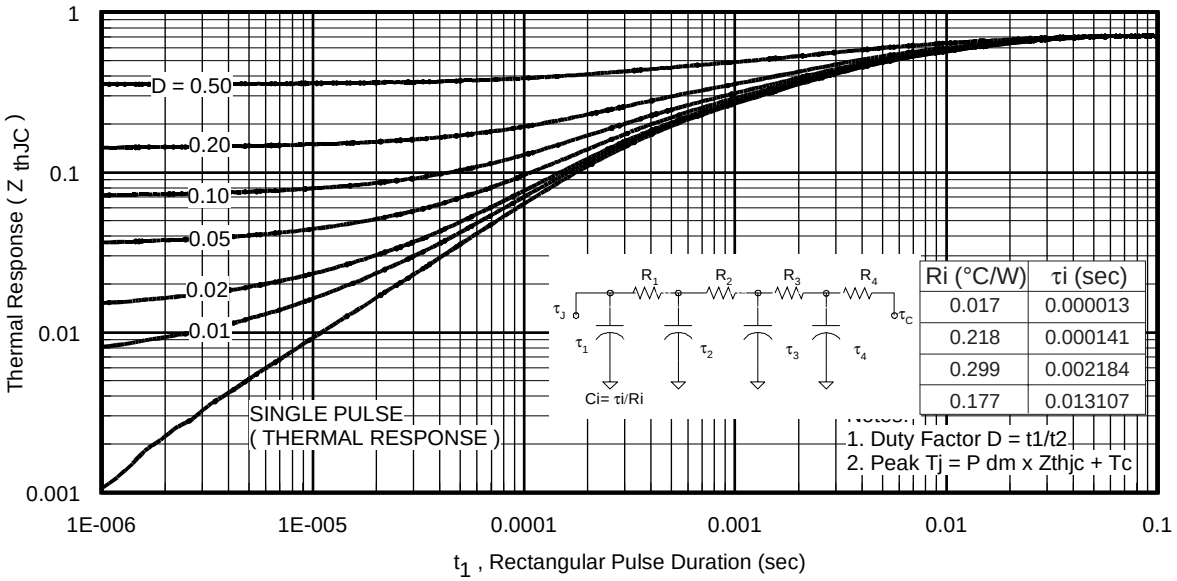


Fig 19. Maximum Transient Thermal Impedance, Junction-to-Case (IGBT)

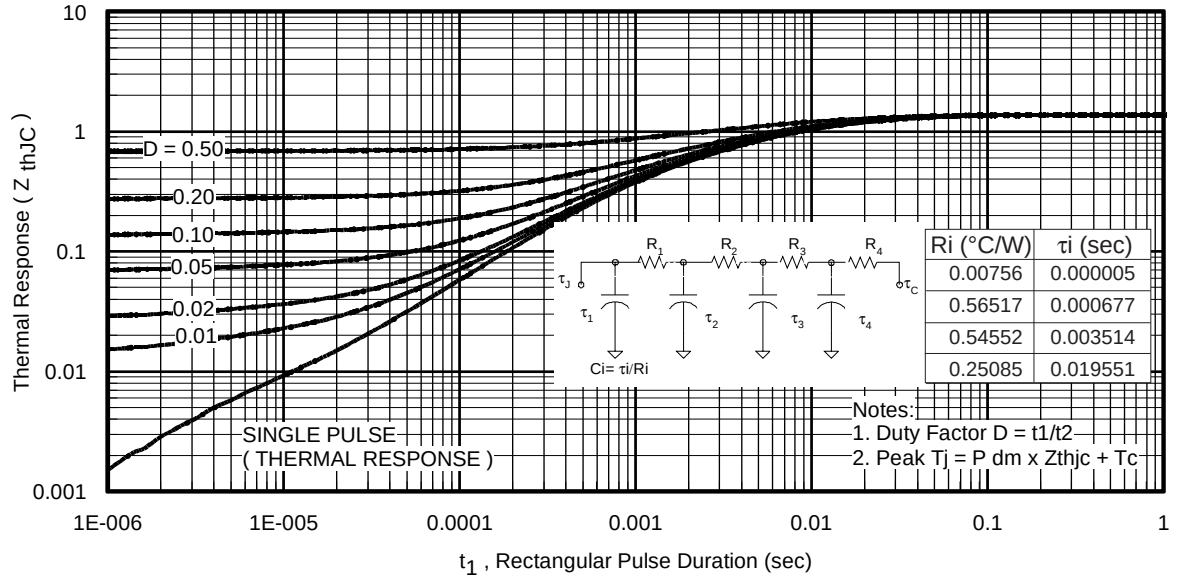


Fig. 20. Maximum Transient Thermal Impedance, Junction-to-Case (DIODE)

 © 2012 International Rectifier

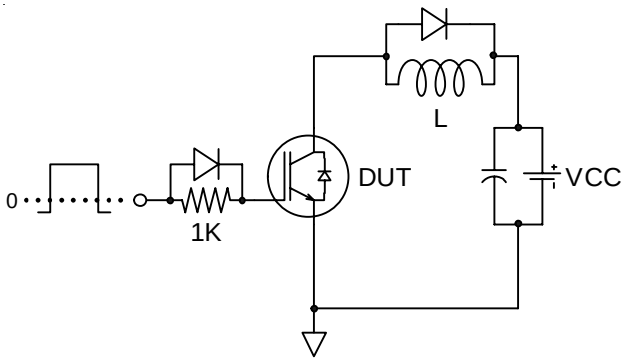


Fig.C.T.1 - Gate Charge Circuit (turn-off)

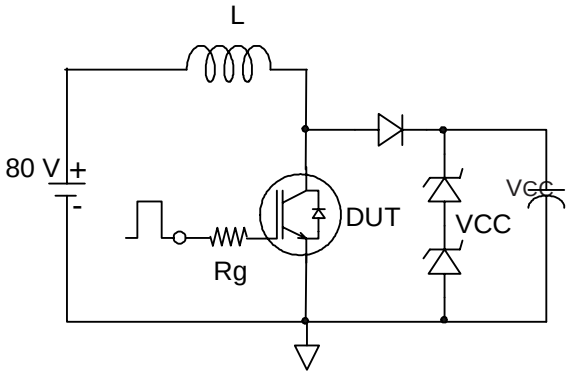


Fig.C.T.2 - RBSOA Circuit

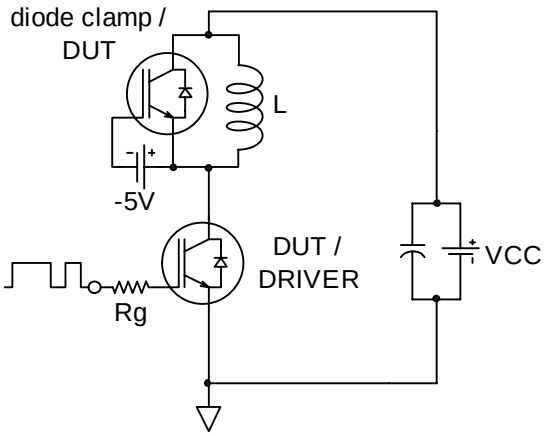


Fig.C.T.3 - Switching Loss Circuit

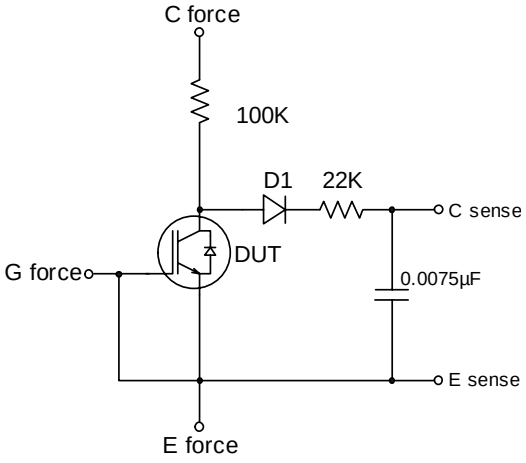


Fig.C.T.4 - BVCES Filter Circuit

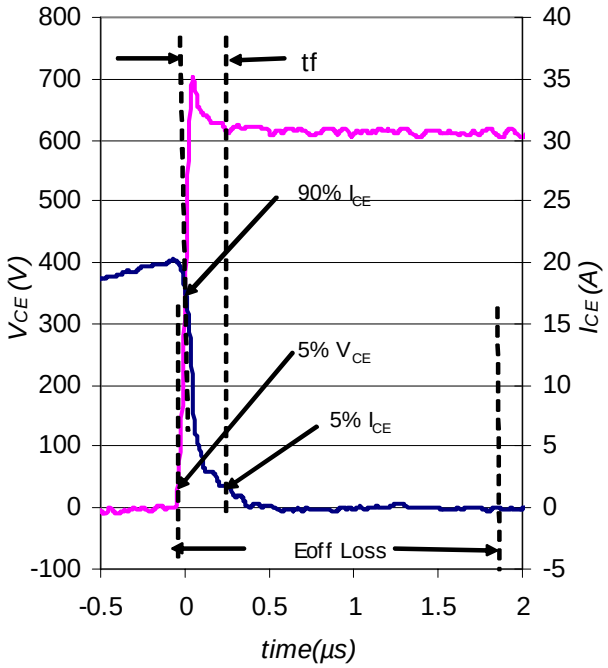
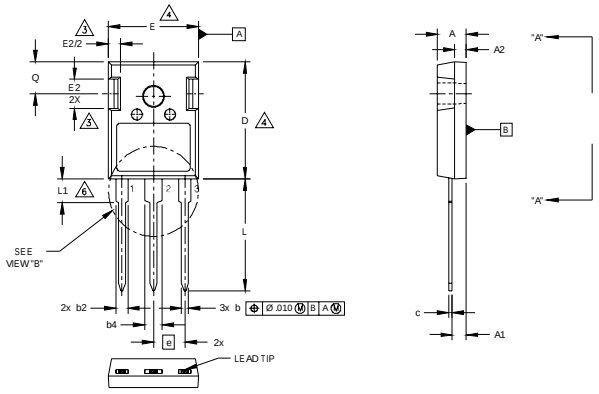


Fig. WF1 - Typ. Turn-off Loss Waveform
@ T_J = 150°C using Fig. CT.3

 © 2012 International Rectifier

TO-247AD Package Outline

(Dimensions are shown in millimeters (inches))



SYMBOL	DIMENSIONS				NOTES
	INCHES		MILLIMETERS		
	MIN.	MAX.	MIN.	MAX.	
A	.190	.204	4.83	5.20	
A1	.090	.100	2.29	2.54	
A2	.075	.085	1.91	2.16	
b	.042	.052	1.07	1.33	
b2	.075	.094	1.91	2.41	
b4	.113	.133	2.87	3.38	
c	.022	.026	0.55	0.68	
D	.819	.830	20.80	21.10	4
D1	.640	694	16.25	17.65	5
E	.620	.635	15.75	16.13	4
E1	.512	.570	13.00	14.50	
E2	.145	.196	3.68	5.00	
e	.215 Typical		5.45 Typical		
L	.780	.800	19.80	20.32	
L1	.161	.173	4.10	4.40	
ø P	.138	.143	3.51	3.65	
Q	.216	.236	5.49	6.00	
S	.238	.248	6.04	6.30	

LEAD ASSIGNMENTS

HEXFET

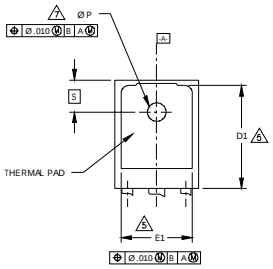
1.– GATE
2.– DRAIN
3.– SOURCE
4.– DRAIN

IGBTs, CoPACK

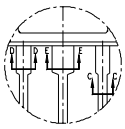
1.– GATE
2.– COLLECTOR
3.– EMITTER
4.– COLLECTOR

DIODES

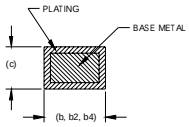
1.– ANODE/OPEN
2.– CATHODE
3.– ANODE



VIEW: "A" - "A"



VIEW: "B"



SECTION: C-C, D-D, E-E

NOTES:

1 DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M 1994.

2 DIMENSIONS ARE SHOWN IN INCHES AND MILLIMETERS.

3 CONTOUR OF SLOT OPTIONAL.

4 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.

5 THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS D1 & E1.

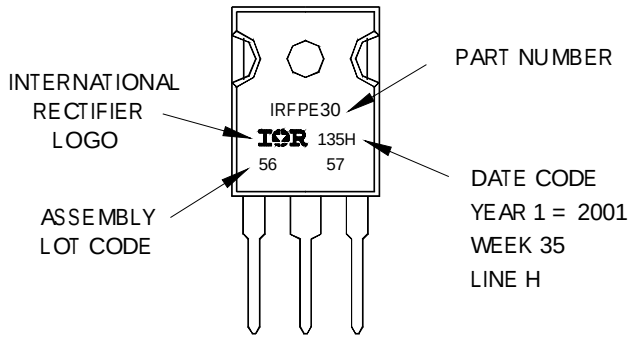
6 LEAD FINISH UNCONTROLLED IN L1.

7 ø P TO HAVE A MAXIMUM DRAFT ANGLE OF 1.5 ° TO THE TOP OF THE PART WITH A MAXIMUM HOLE DIAMETER OF .154 INCH.

TO-247AD Part Marking Information

EXAMPLE: THIS IS AN IRFPE30
WITH ASSEMBLY
LOT CODE 5657
ASSEMBLED ON WW 35, 2001
IN THE ASSEMBLY LINE "H"

Note: "P" in assembly line position
indicates "Lead-Free"



TO-247AD package is not recommended for Surface Mount Application.

Note: For the most current drawing please refer to IR website at http://www.irf.com/package/

 © 2012 International Rectifier

Qualification information†

Qualification level	Industrial†† (per JEDEC JESD47F ††† guidelines)	
Moisture Sensitivity Level	TO-247AD	N/A (per JEDEC J-STD-020D†††)
RoHS compliant	Yes	

† Qualification standards can be found at International Rectifier's web site http://www.irf.com/product-info/reliability

†† Higher qualification ratings may be available should the user have such requirements. Please contact your International Rectifier sales representative for further information: http://www.irf.com/whoto-call/salesrep/

††† Applicable version of JEDEC standard at the time of product release.

 © 2012 International Rectifier

ENTEGRECİ

Bu belge www.entegreci.com üzerinden sunulmaktadır.

Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

www.entegreci.com

Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

www.entegreci.com | **destek@entegreci.com** | **0850 305 90 34**

Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

Bu sayfa Entegreci tarafından eklenmiştir. Belgenin önceki sayfaları asıl yayıncısına aittir ve içeriği değiştirilmemiştir; en güncel sürüm için belgenin yayıncısına başvurun.