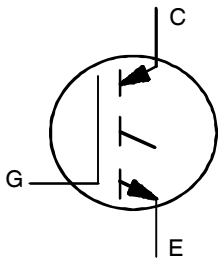
International
IOR Rectifier

IRG7PH42UPbF
IRG7PH42U-EP

INSULATED GATE BIPOLAR TRANSISTOR

Features

- Low $V_{CE\ (ON)}$ trench IGBT technology
- Low switching losses
- Maximum junction temperature 175 °C
- Square RBSOA
- 100% of the parts tested for I_{LM}
- Positive $V_{CE\ (ON)}$ temperature co-efficient
- Tight parameter distribution
- Lead-Free



n-channel

V_{CES} = 1200V

I_C = 60A, T_C = 100°C

$T_{J(max)}$ =175°C

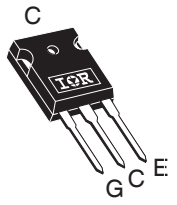
$V_{CE(on)}$ typ. = 1.7V

Benefits

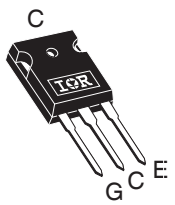
- High efficiency in a wide range of applications
- Suitable for a wide range of switching frequencies due to low $V_{CE\ (ON)}$ and low switching losses
- Rugged transient performance for increased reliability
- Excellent current sharing in parallel operation

Applications

- U.P.S
- Welding
- Solar inverter
- Induction heating



TO-247AC
IRG7PH42UPbF



TO-247AD
IRG7PH42U-EP

G	C	E
Gate	Collector	Emitter

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	1200	V
I_C @ T_C = 25°C	Continuous Collector Current (Silicon Limited)	90⑤	A
I_C @ T_C = 100°C	Continuous Collector Current (Silicon Limited)	60	
$I_{NOMINAL}$	Nominal Current	30	
I_{CM}	Pulse Collector Current, V_{GE} = 15V	90	
I_{LM}	Clamped Inductive Load Current, V_{GE} = 20V ①	120	
V_{GE}	Continuous Gate-to-Emitter Voltage	±30	V
P_D @ T_C = 25°C	Maximum Power Dissipation	385	W
P_D @ T_C = 100°C	Maximum Power Dissipation	192	
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +175	°C
	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) TO-247AC ④	—	—	0.39	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink (flat, greased surface) ④	—	0.24	—	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (typical socket mount)	—	40	—	

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) ③
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	1.7	2.0	V	I_C = 30A, V_{GE} = 15V, T_J = 25°C ②
		—	2.1	—		I_C = 30A, V_{GE} = 15V, T_J = 150°C ②
		—	2.2	—		I_C = 30A, V_{GE} = 15V, T_J = 175°C ②
$V_{GE(th)}$	Gate Threshold Voltage	3.0	—	6.0	V	V_{CE} = V_{GE}, I_C = 1mA
$\Delta V_{GE(th)}/\Delta TJ$	Threshold Voltage temp. coefficient	—	-16	—	mV/°C	V_{CE} = V_{GE}, I_C = 1mA (25°C - 175°C)
gfe	Forward Transconductance	—	32	—	S	V_{CE} = 50V, I_C = 30A, PW = 80µs
I_{CES}	Collector-to-Emitter Leakage Current	—	1	150	µA	V_{GE} = 0V, V_{CE} = 1200V
		—	700	—		V_{GE} = 0V, V_{CE} = 1200V, T_J = 175°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)	—	157	236	nC	I_C = 30A ②
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	21	32		V_{GE} = 15V
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	69	104		V_{CC} = 600V
E_{on}	Turn-On Switching Loss	—	2105	2374	µJ	I_C = 30A, V_{CC} = 600V, V_{GE} = 15V ②
E_{off}	Turn-Off Switching Loss	—	1182	1424		R_G = 10Ω, L = 200µH,T_J = 25°C
E_{total}	Total Switching Loss	—	3287	3798		Energy losses include tail & diode reverse recovery
$t_{d(on)}$	Turn-On delay time	—	25	34	ns	Diode clamp the same as IRG7PH42UDPbF
t_r	Rise time	—	32	41		
$t_{d(off)}$	Turn-Off delay time	—	229	271		
t_f	Fall time	—	63	86		
E_{on}	Turn-On Switching Loss	—	3186	—	µJ	I_C = 30A, V_{CC} = 600V, V_{GE}=15V ②
E_{off}	Turn-Off Switching Loss	—	2153	—		R_G=10Ω, L=200µH, T_J = 175°C
E_{total}	Total Switching Loss	—	5339	—		Energy losses include tail & diode reverse recovery
$t_{d(on)}$	Turn-On delay time	—	20	—	ns	Diode clamp the same as IRG7PH42UDPbF
t_r	Rise time	—	31	—		
$t_{d(off)}$	Turn-Off delay time	—	310	—		
t_f	Fall time	—	162	—		
C_{ies}	Input Capacitance	—	3338	—	pF	V_{GE} = 0V
C_{oes}	Output Capacitance	—	124	—		V_{CC} = 30V
C_{res}	Reverse Transfer Capacitance	—	75	—		f = 1.0Mhz
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				I_C = 120A V_{CC} = 960V, Vp =1200V Rg = 10Ω, V_{GE} = +20V to 0V, T_J =175°C

Notes:

① V_{CC} = 80% (V_{CES}), V_{GE} = 20V, L = 22µH, R_G = 10Ω

② Pulse width ≤ 400µs; duty cycle ≤ 2%.

③ Refer to AN-1086 for guidelines for measuring $V_{(BR)CES}$ safely.

④ R_θ is measured at T_J of approximately 90°C.

⑤ 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.

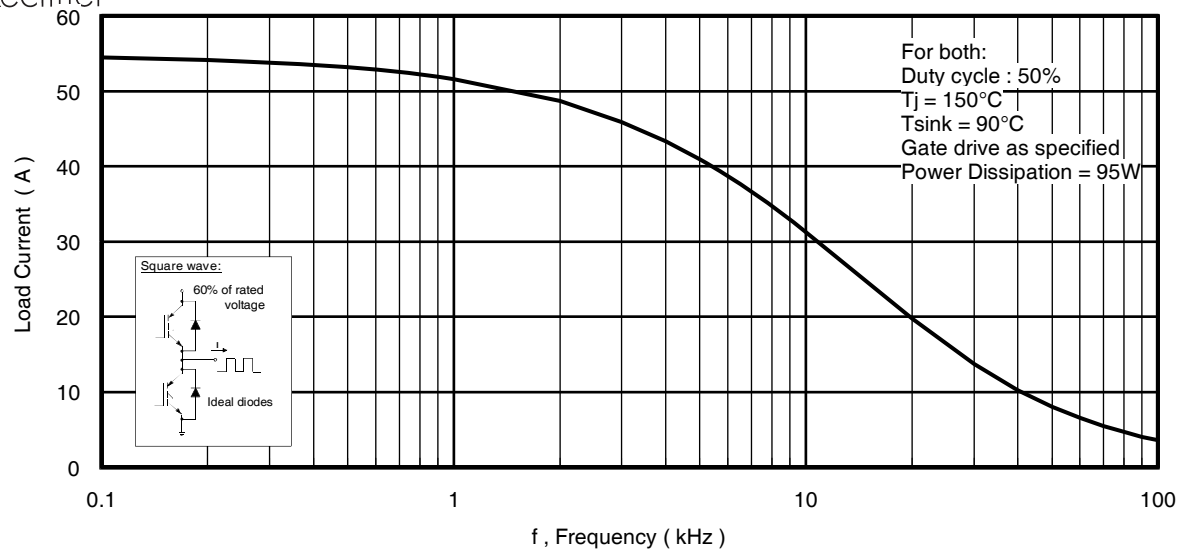


Fig. 1 - Typical Load Current vs. Frequency
(Load Current = I_{RMS} of fundamental)

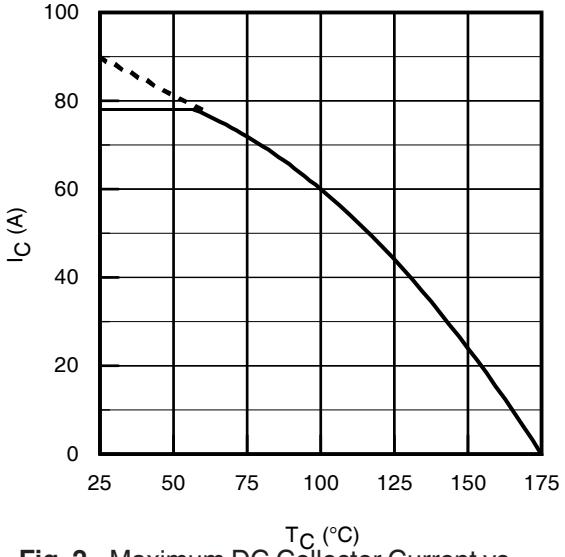


Fig. 2 - Maximum DC Collector Current vs. Case Temperature

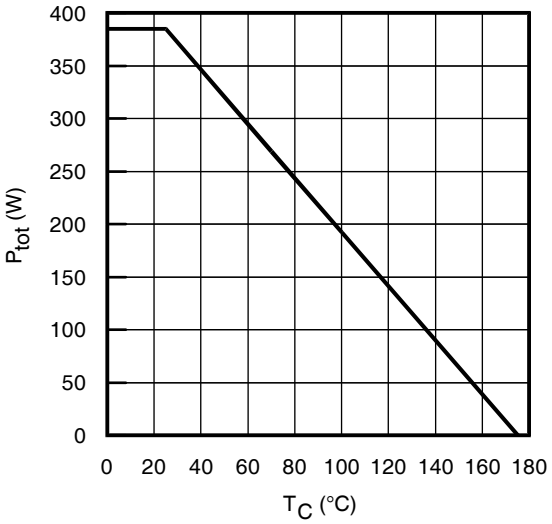


Fig. 3 - Power Dissipation vs. Case Temperature

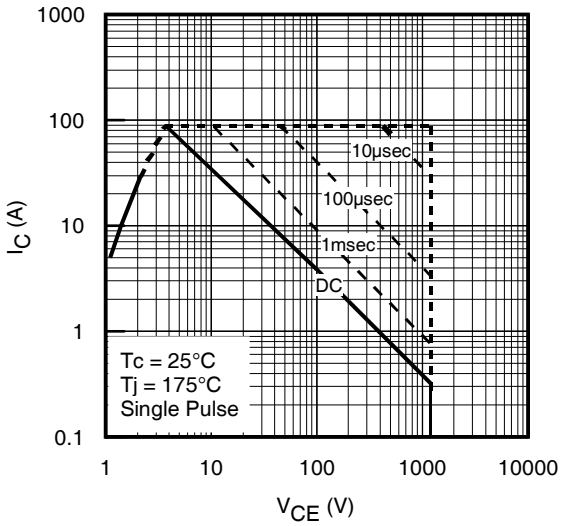


Fig. 4 - Forward SOA
T_C = 25°C, $T_J \leq$ 175°C; V_{GE} =15V

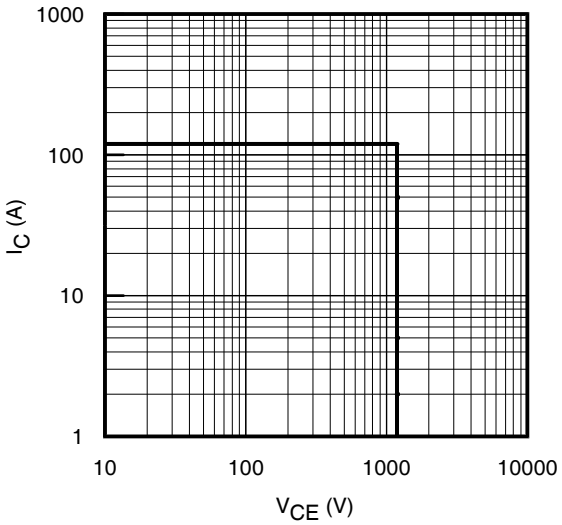


Fig. 5 - Reverse Bias SOA
T_J = 175°C; V_{GE} =20V

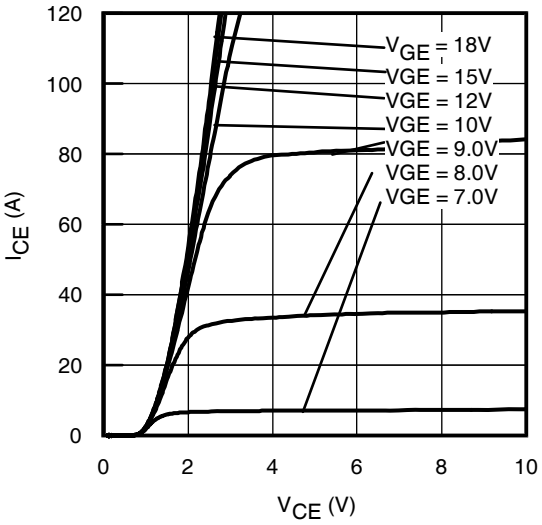


Fig. 6 - Typ. IGBT Output Characteristics
T_J = -40°C; tp =20µs

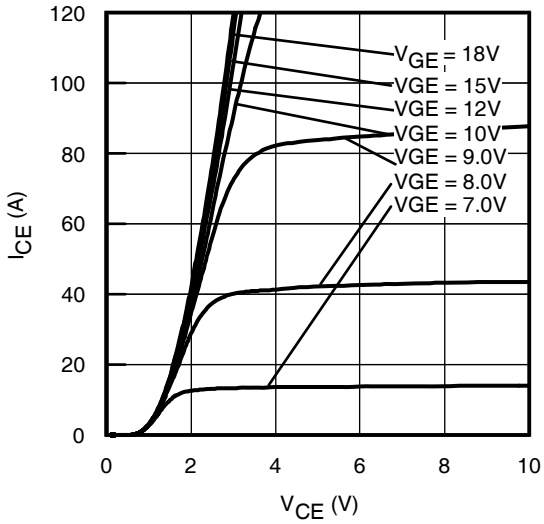


Fig. 7 - Typ. IGBT Output Characteristics
T_J = 25°C; tp = 20µs

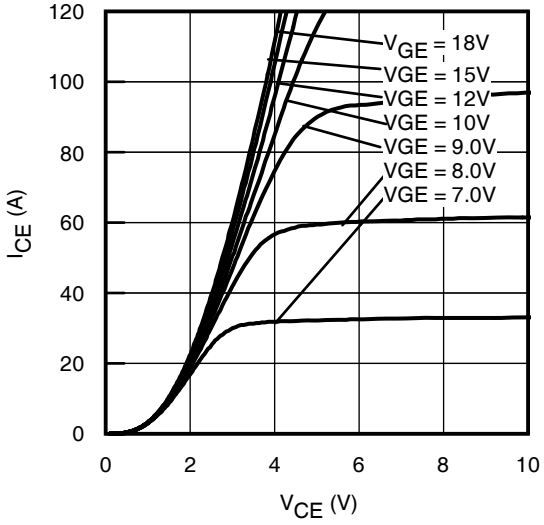


Fig. 8 - Typ. IGBT Output Characteristics
T_J = 175°C; tp = 20µs

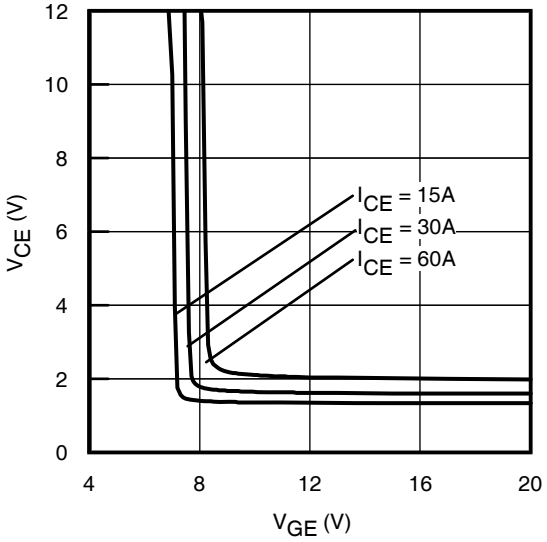


Fig. 9 - Typical V_{CE} vs. V_{GE}
T_J = -40°C

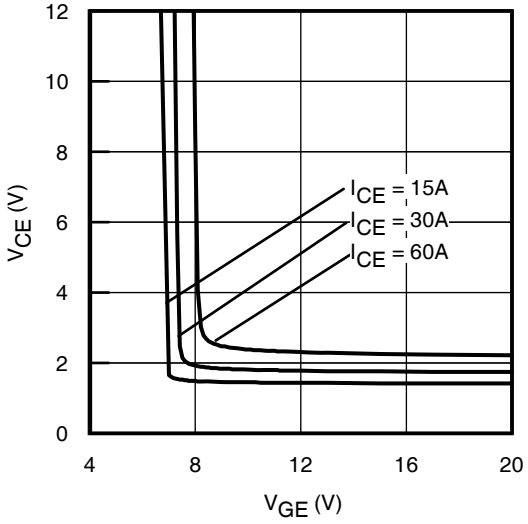


Fig. 10 - Typical V_{CE} vs. V_{GE}
T_J = 25°C

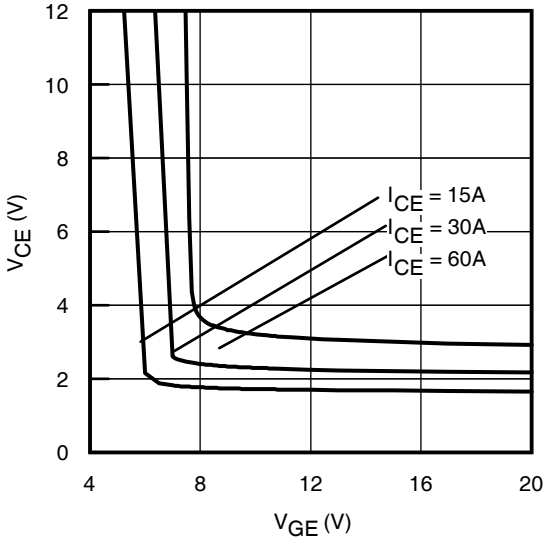


Fig. 11 - Typical V_{CE} vs. V_{GE}
T_J = 175°C

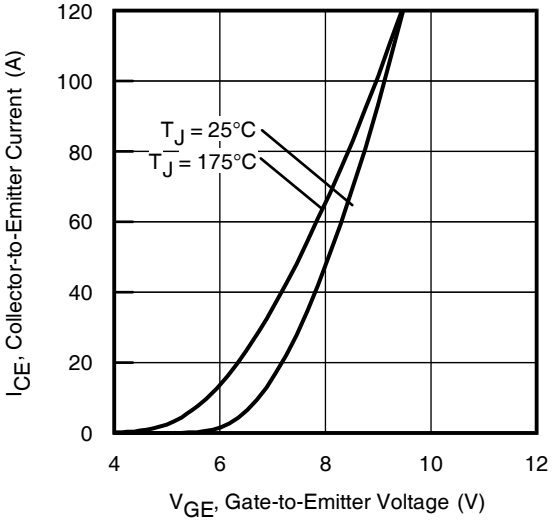


Fig. 12- Typ. Transfer Characteristics
V_{CE} = 50V; tp = 20µs

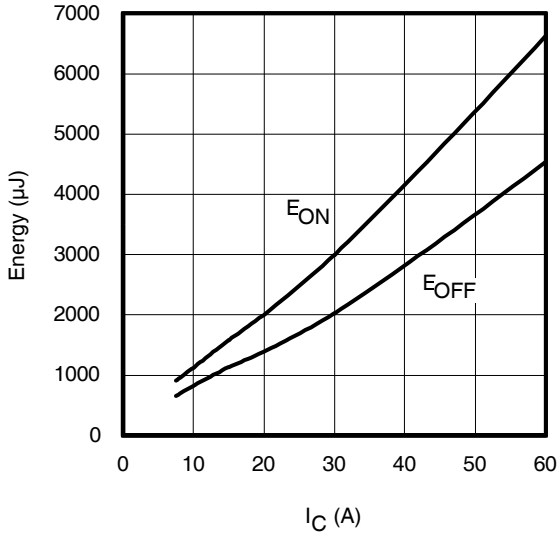


Fig. 13 - Typ. Energy Loss vs. I_C
T_J = 175°C; L = 200µH; V_{CE} = 600V, R_G = 10Ω; V_{GE} = 15V

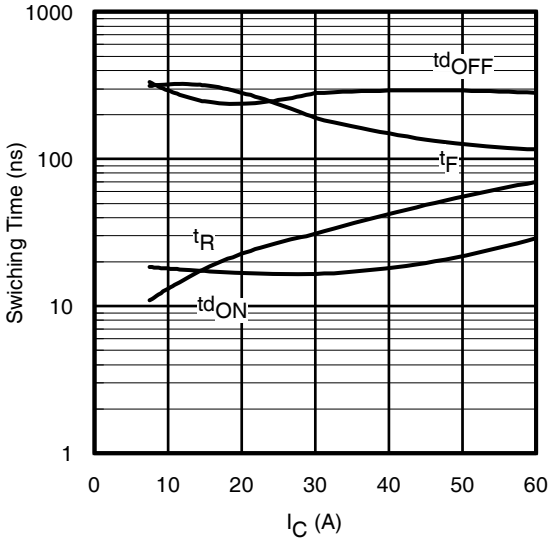


Fig. 14 - Typ. Switching Time vs. I_C
T_J = 175°C; L = 200µH; V_{CE} = 600V, R_G = 10Ω; V_{GE} = 15V

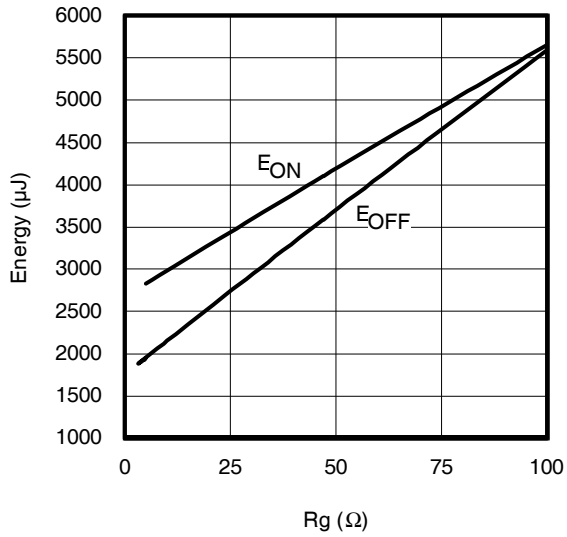


Fig. 15 - Typ. Energy Loss vs. R_G
T_J = 175°C; L = 200µH; V_{CE} = 600V, I_{CE} = 30A; V_{GE} = 15V

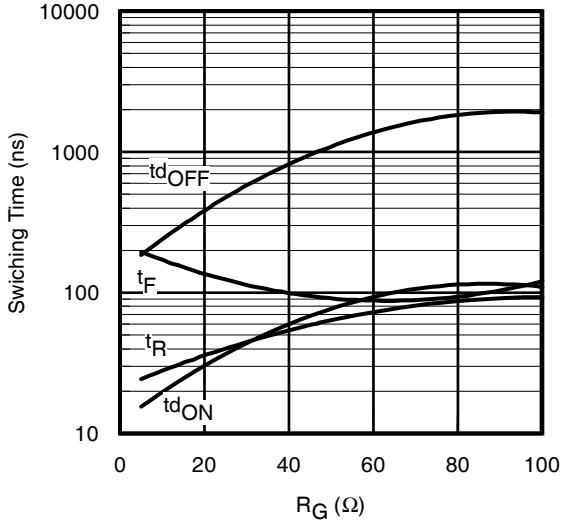


Fig. 16 - Typ. Switching Time vs. R_G
T_J = 175°C; L = 200µH; V_{CE} = 600V, I_{CE} = 30A; V_{GE} = 15V

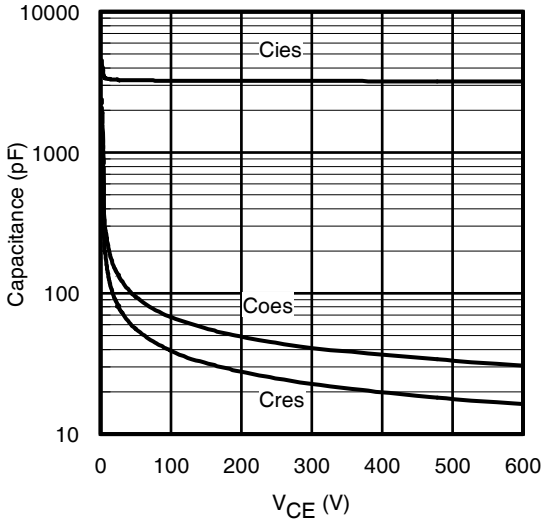


Fig. 17 - Typ. Capacitance vs. V_{CE}
V_{GE}= 0V; f = 1MHz

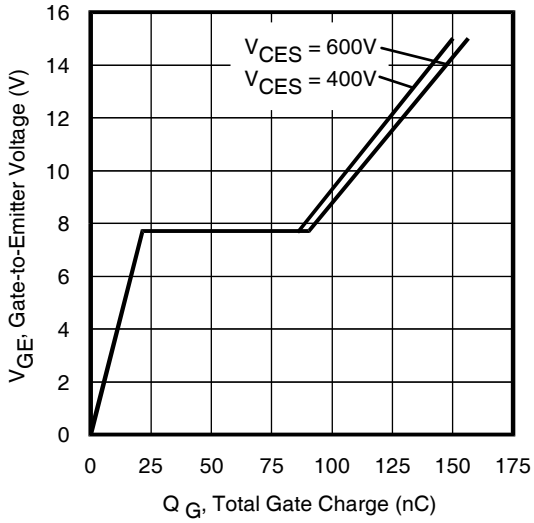


Fig. 18- Typical Gate Charge vs. V_{GE}
I_{CE} = 30A; L = 600µH

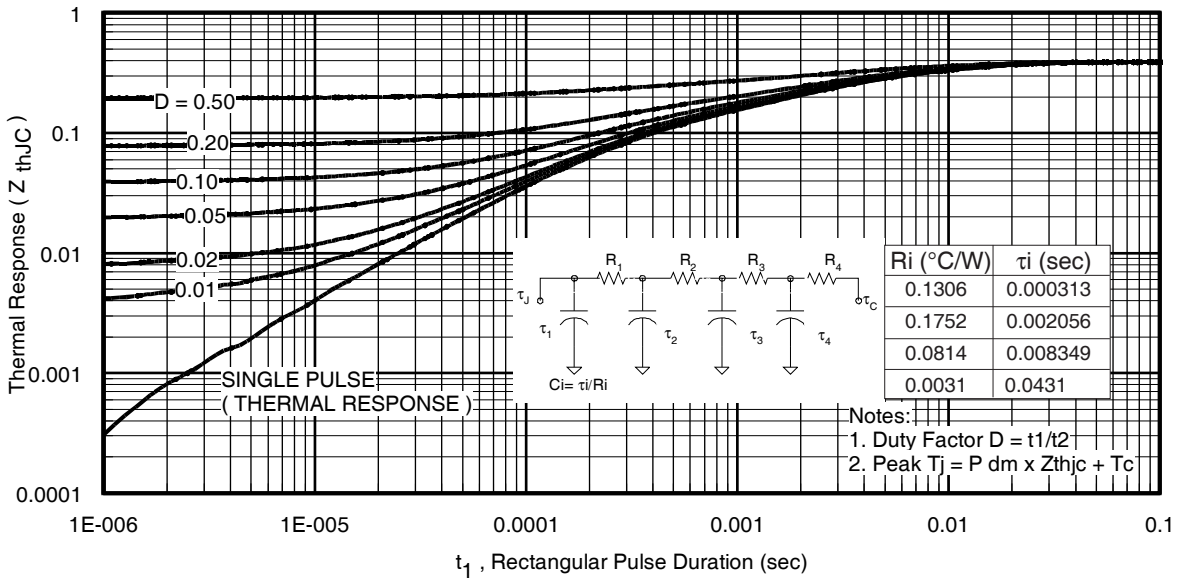


Fig 19. Maximum Transient Thermal Impedance, Junction-to-Case (IGBT) TO-247AC

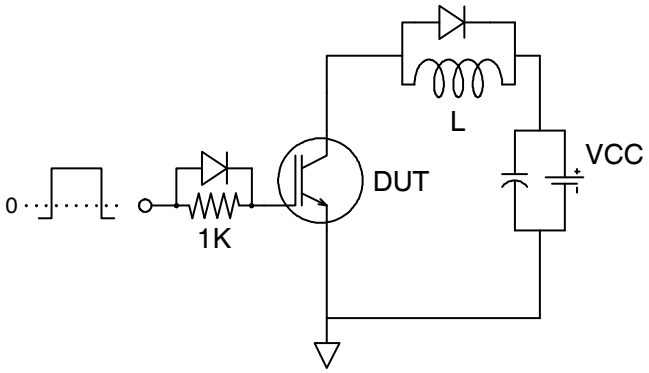


Fig.C.T.1 - Gate Charge Circuit (turn-off)

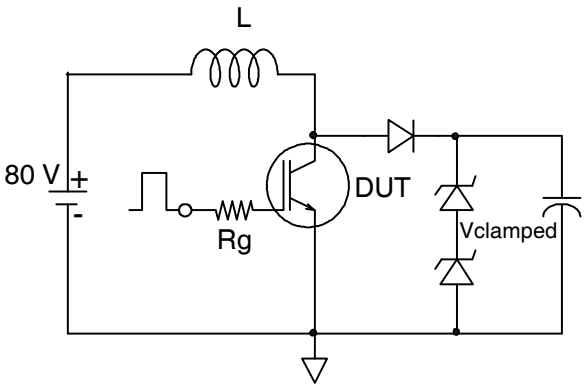


Fig.C.T.2 - RBSOA Circuit

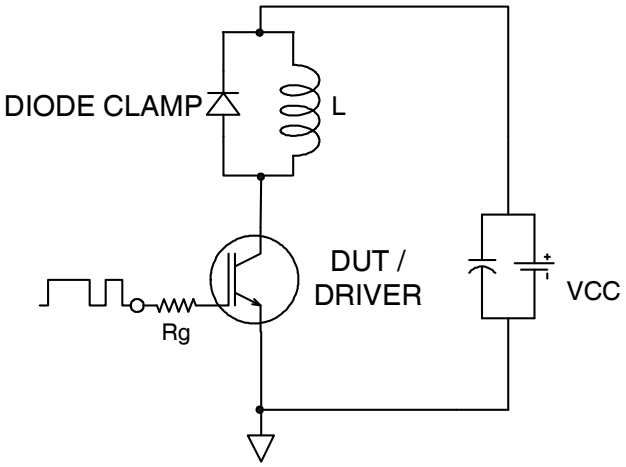


Fig.C.T.3 - Switching Loss Circuit

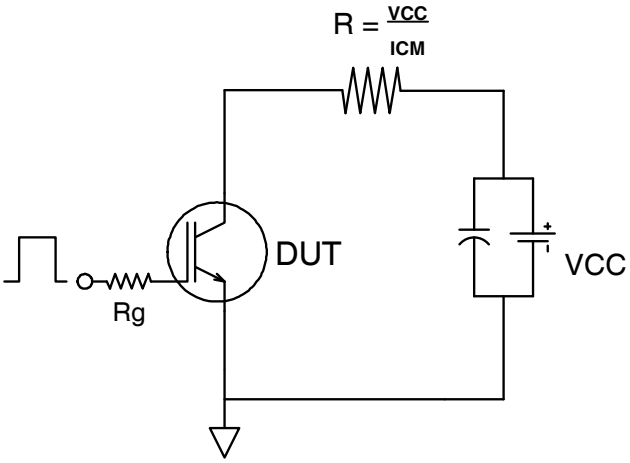


Fig.C.T.4 - Resistive Load Circuit

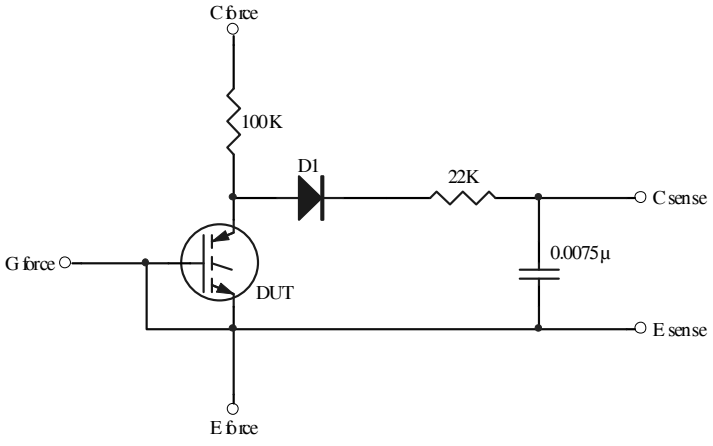


Fig.C.T.5 - BVCES Filter Circuit

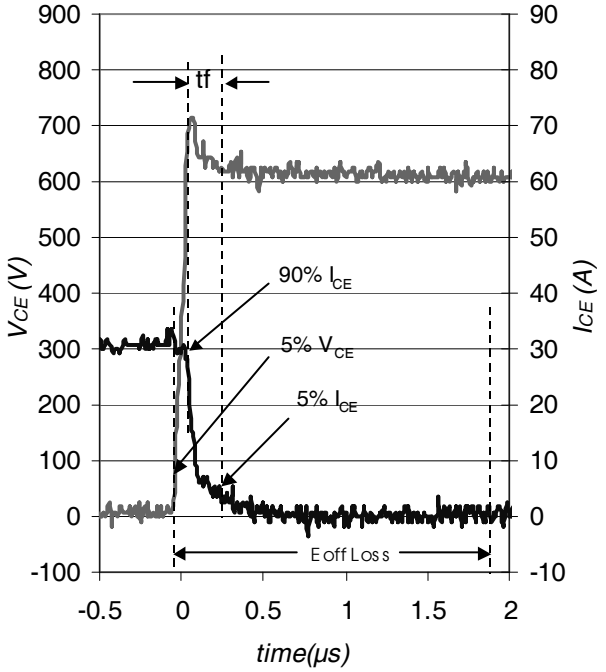


Fig. WF1 - Typ. Turn-off Loss Waveform
@ T_J = 175°C using Fig. CT.4

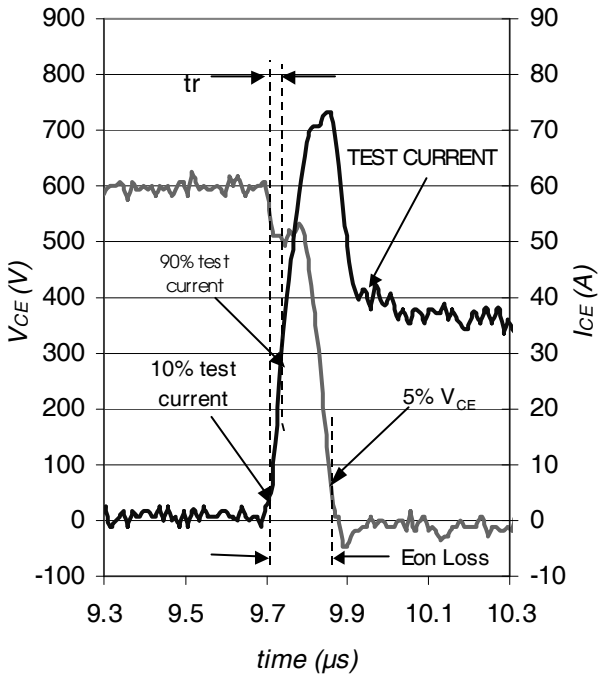
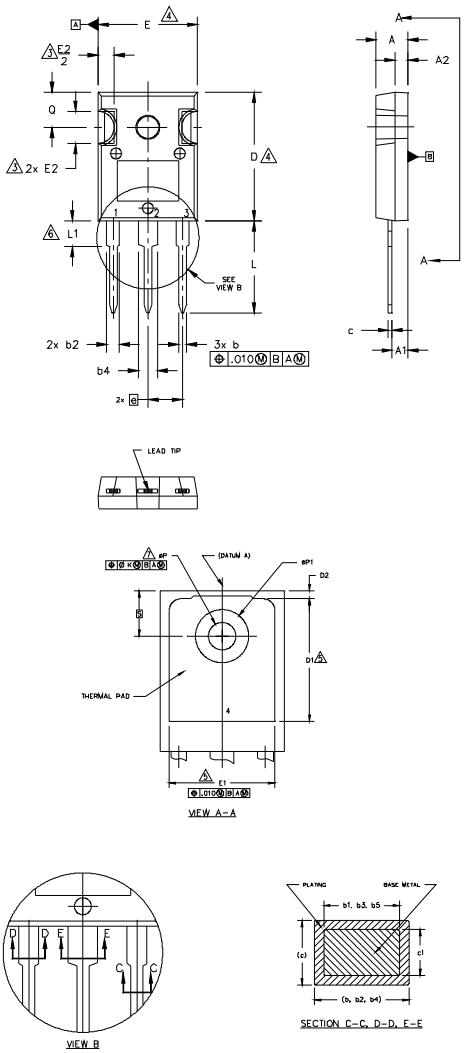


Fig. WF2 - Typ. Turn-on Loss Waveform
@ T_J = 175°C using Fig. CT.4

TO-247AC Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M 1994.
2. DIMENSIONS ARE SHOWN IN INCHES.
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. øP TO HAVE A MAXIMUM DRAFT ANGLE OF 1.5 ° TO THE TOP OF THE PART WITH A MAXIMUM HOLE DIAMETER OF .154 INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-247AC .

SYMBOL	DIMENSIONS				NOTES
	INCHES		MILLIMETERS		
	MIN.	MAX.	MIN.	MAX.	
A	.183	.209	4.65	5.31	
A1	.087	.102	2.21	2.59	
A2	.059	.098	1.50	2.49	
b	.039	.055	0.99	1.40	
b1	.039	.053	0.99	1.35	
b2	.065	.094	1.65	2.39	
b3	.065	.092	1.65	2.34	
b4	.102	.135	2.59	3.43	
b5	.102	.133	2.59	3.38	
c	.015	.035	0.38	0.89	
c1	.015	.033	0.38	0.84	
D	.776	.815	19.71	20.70	4
D1	.515	–	13.08	–	5
D2	.020	.053	0.51	1.35	
E	.602	.625	15.29	15.87	4
E1	.530	–	13.46	–	
E2	.178	.216	4.52	5.49	
e	.215 BSC		5.46 BSC		
øk	.010		0.25		
L	.559	.634	14.20	16.10	
L1	.146	.169	3.71	4.29	
øP	.140	.144	3.56	3.66	
øP1	–	.291	–	7.39	
Q	.209	.224	5.31	5.69	
S	.217 BSC		5.51 BSC		

LEAD ASSIGNMENTS

HEXFET

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

IGBTs, CoPACK

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

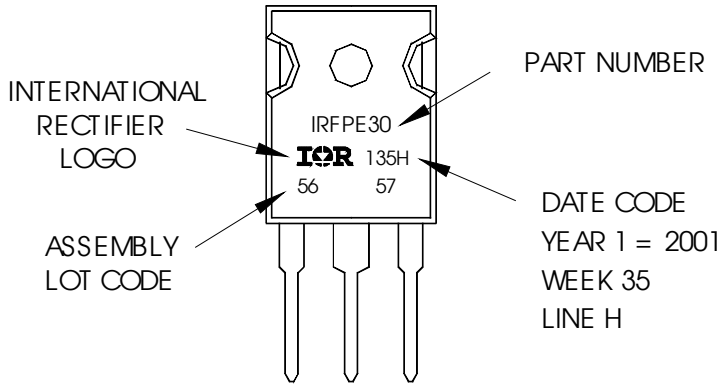
DIODES

1.– ANODE/OPEN
2.– CATHODE
3.– ANODE

TO-247AC 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"

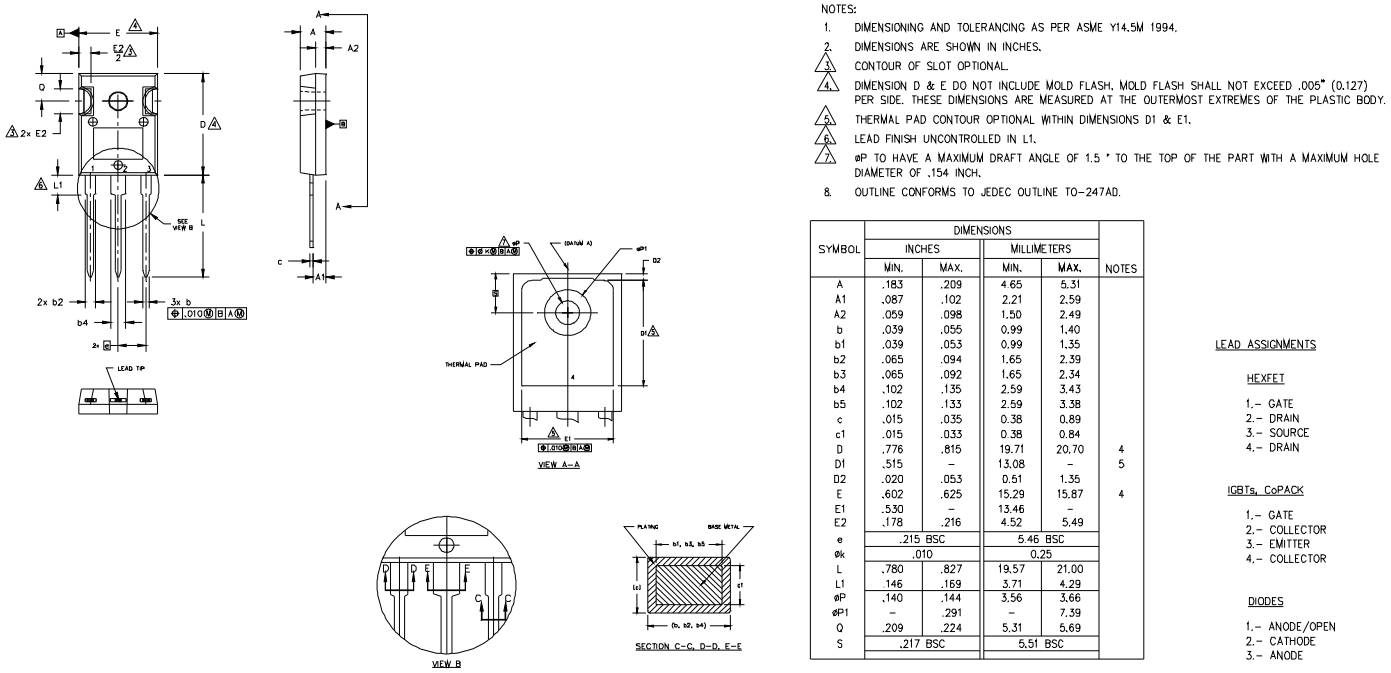


TO-247AC package is not recommended for Surface Mount Application.

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

TO-247AD Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M 1994.
2. DIMENSIONS ARE SHOWN IN INCHES.
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. øP TO HAVE A MAXIMUM DRAFT ANGLE OF 1.5 ° TO THE TOP OF THE PART WITH A MAXIMUM HOLE DIAMETER OF .154 INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-247AD.

SYMBOL	DIMENSIONS				NOTES
	INCHES		MILLIMETERS		
	MIN.	MAX.	MIN.	MAX.	
A	.183	.209	4.65	5.31	
A1	.087	.102	2.21	2.59	
A2	.059	.098	1.50	2.49	
b	.039	.055	0.99	1.40	
b1	.039	.053	0.99	1.35	
b2	.065	.094	1.65	2.39	
b3	.065	.092	1.65	2.34	
b4	.102	.135	2.59	3.43	
b5	.102	.133	2.59	3.38	
c	.015	.035	0.38	0.89	
c1	.015	.033	0.38	0.84	
D	.776	.815	19.71	20.70	4
D1	.515	–	13.08	–	5
D2	.020	.053	0.51	1.35	
E	.602	.625	15.29	15.87	4
E1	.530	–	13.46	–	
E2	.178	.216	4.52	5.49	
e	.215 BSC		5.46 BSC		
øk	.010		0.25		
L	.780	.827	19.57	21.00	
L1	.146	.169	3.71	4.29	
øP	.140	.144	3.56	3.66	
øP1	–	.291	–	7.39	
Q	.209	.224	5.31	5.69	
S	.217 BSC		5.51 BSC		

LEAD ASSIGNMENTS

HEXFET

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

IGBTs, CoPACK

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

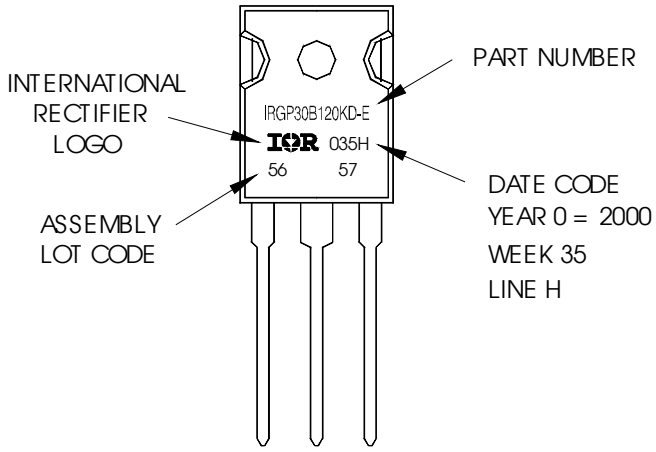
DIODES

1.– ANODE/OPEN
2.– CATHODE
3.– ANODE

TO-247AD Part Marking Information

EXAMPLE: THIS IS AN IRGP30B120KD-E
WITH ASSEMBLY
LOT CODE 5657
ASSEMBLED ON WW 35, 2000
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/

Data and specifications subject to change without notice.
This product has been designed and qualified for Industrial market.
Qualification Standards can be found on IR's Web site.

International
IOR Rectifier

IR WORLD HEADQUARTERS: 101N.Sepulveda blvd, El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903
Visit us at www.irf.com for sales contact information. 03/2011

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Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

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Toplu alım ve teklif

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Teklif isteyin

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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.

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