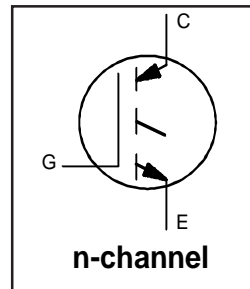


IRGP4050PbF

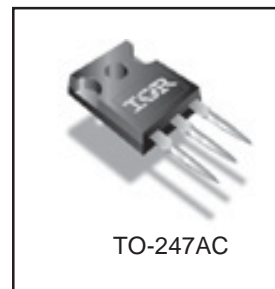
PDP Switch

Features

- Key parameters optimized for PDP sustain & Energy recovery applications
- 104A continuous collector current rating reduces component count
- High pulse current rating makes it ideal for capacitive load circuits
- Low temperature co-efficient of $V_{CE(ON)}$ ensures reduced power dissipation at operating junction temperatures
- Reverse voltage avalanche rating improves the robustness in sustain driver application
- Short fall & rise times for fast switching
- Lead-Free



$V_{CES} = 250V$
$V_{CE(on) typ.} = 1.64V$
@ $V_{GE} = 15V, I_C = 30A$



Description

This IGBT is specifically designed for sustain & energy recovery application in plasma display panels. This IGBT features low $V_{CE(ON)}$ and fast switching times to improve circuit efficiency and reliability. Low temperature co-efficient of $V_{CE(ON)}$ makes this IGBT an ideal device for PDP sustain driver application.

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	250	V
$I_C @ T_C = 25^\circ C$	Continuous Collector Current	104*	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	56	
I_{CM}	Pulse Collector Current ①	208	
I_{LM}	Clamped Inductive Load current ②	290	
V_{GE}	Gate-to-Emitter Voltage	± 20	V
E_{ARV}	Reverse Voltage Avalanche Energy ③	1240	mJ
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	330	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	130	
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	$^\circ C$
	Solder Temperature Range, for 10 sec.	300 (0.063 in. (1.6mm) from case)	

Thermal / Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case- IGBT	—	—	0.38	$^\circ C/W$
$R_{\theta CS}$	Case-to-Sink, flat, greased surface	—	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient, typical socket mount	—	—	40	
Wt	Weight	—	6 (0.21)	—	g (oz.)

*Package limited to 60A.

IRGP4050PbF

International
IR Rectifier

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

Parameter	Min.	Typ.	Max.	Units	Conditions	
V _{(BR)CES}	250	—	—	V	V _{GE} = 0V, I _C = 250μA	
V _{(BR)ECS}	18	—	—	V	V _{GE} = 0V, I _C = 1.0A	
ΔV _{(BR)CES} /ΔT _J	—	8.2	—	mV/°C	V _{GE} = 0V, I _C = 1mA	
V _{CE(on)}	Collector-to-Emitter Saturation Voltage	—	1.64	1.90	V	I _C = 30A I _C = 56A I _C = 104A, T _J = 150°C V _{GE} = 15V See Fig. 2, 5
		—	2.04	—		
		—	2.60	—		
V _{GE(th)}	3.0	—	6.0		V _{CE} = V _{GE} , I _C = 250μA	
ΔV _{GE(th)} /ΔT _J	—	-11	—	mV/°C	V _{CE} = V _{GE} , I _C = 0.25mA	
g _{fe}	34	51	—	S	V _{CE} = 100V, I _C = 56A	
I _{CES}	Zero Gate Voltage Collector Current	—	—	250	μA	V _{GE} = 0V, V _{CE} = 250V V _{GE} = 0V, V _{CE} = 10V V _{GE} = 0V, V _{CE} = 250V, T _J = 150°C
		—	—	2.0		
		—	—	5000		
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	—	230	350	nC	I _C = 56A V _{CC} = 200V V _{GE} = 15V See Fig. 8
Q _{ge}	—	37	56		
Q _{gc}	—	78	120		
t _{d(on)}	—	37	—	ns	T _J = 25°C I _C = 30A, V _{CC} = 180V V _{GE} = 15V, R _G = 5.0Ω Energy losses include "tail" See Fig. 9, 10, 14
t _r	—	35	—		
t _{d(off)}	—	120	180		
t _f	—	59	89		
E _{on}	—	45	—		
E _{off}	—	125	—	μJ	
E _{TS}	—	170	—		
t _{d(on)}	—	35	—	ns	T _J = 150°C I _C = 30A, V _{CC} = 180V V _{GE} = 15V, R _G = 5.0Ω Energy losses include "tail" See Fig. 11, 14
t _r	—	35	—		
t _{d(off)}	—	130	—		
t _f	—	120	—		
E _{TS}	—	280	—		
L _E	—	13	—	nH	Measured 5mm from package
C _{ies}	—	4650	—	pF	V _{GE} = 0V V _{CC} = 30V, f = 1.0MHz See Fig. 7
C _{oes}	—	480	—		
C _{res}	—	92	—		

Notes:

- ① Repetitive rating; V_{GE} = 20V, pulse width limited by max. junction temperature. (See fig. 13b)
- ② V_{CC} = 80%(V_{CES}), V_{GE} = 20V, L = 10μH, R_G = 5.0Ω, (See fig. 13a).
- ③ Repetitive rating; pulse width limited by maximum junction temperature.
- ④ Pulse width ≤ 2.5ms; duty factor ≤ 0.1%.
- ⑤ Pulse width 5.0μs, single shot.

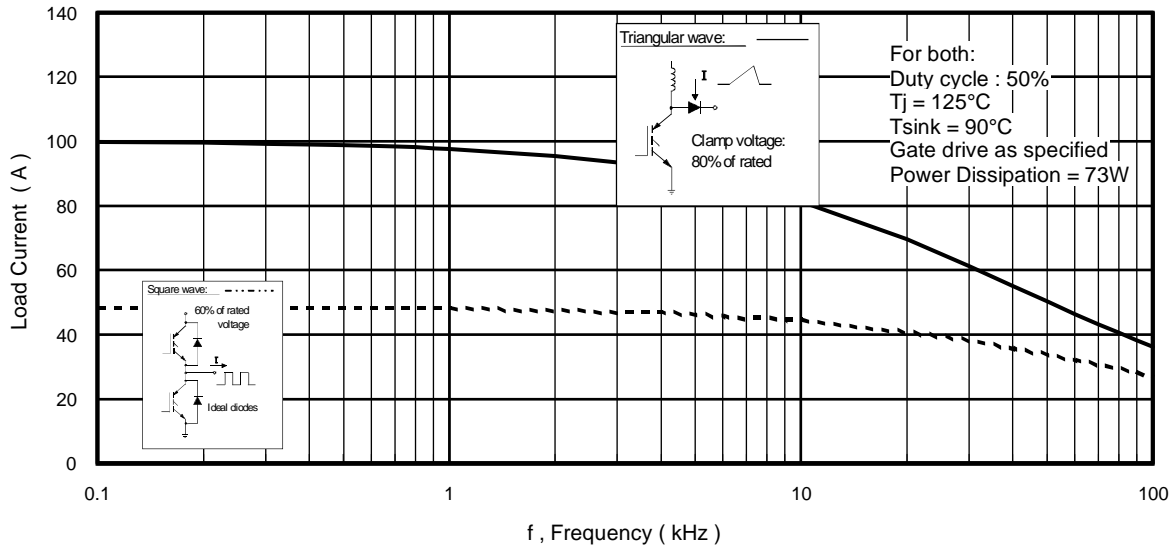


Fig. 1 - Typical Load Current vs. Frequency
(Load Current = I_{RMS} of fundamental)

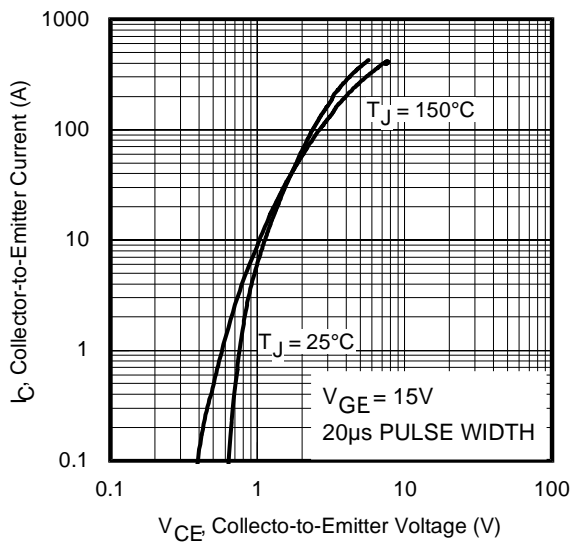


Fig. 2 - Typical Output Characteristics

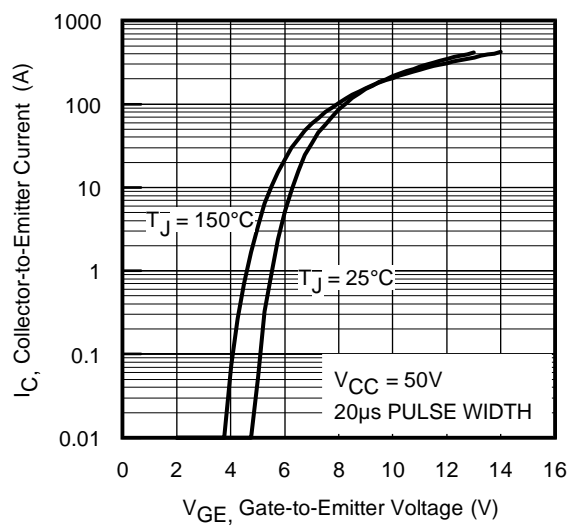


Fig. 3 - Typical Transfer Characteristics

IRGP4050PbF

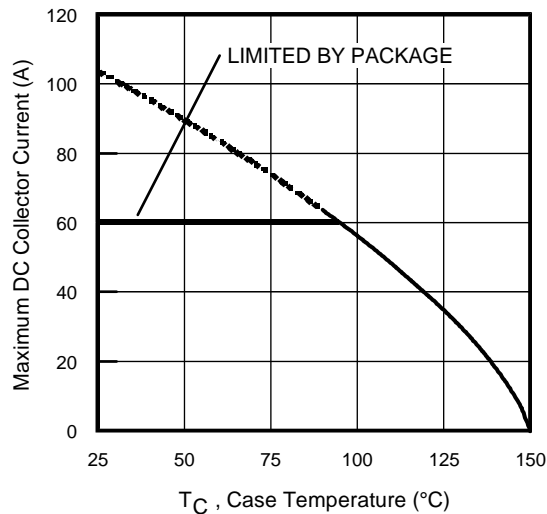


Fig. 4 - Maximum Collector Current vs. Case Temperature

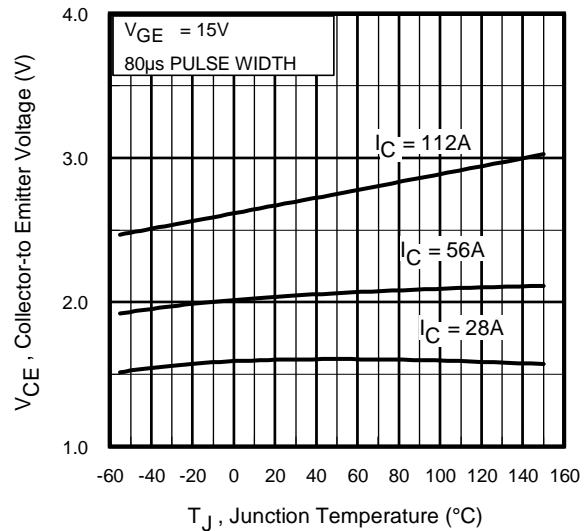


Fig. 5 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

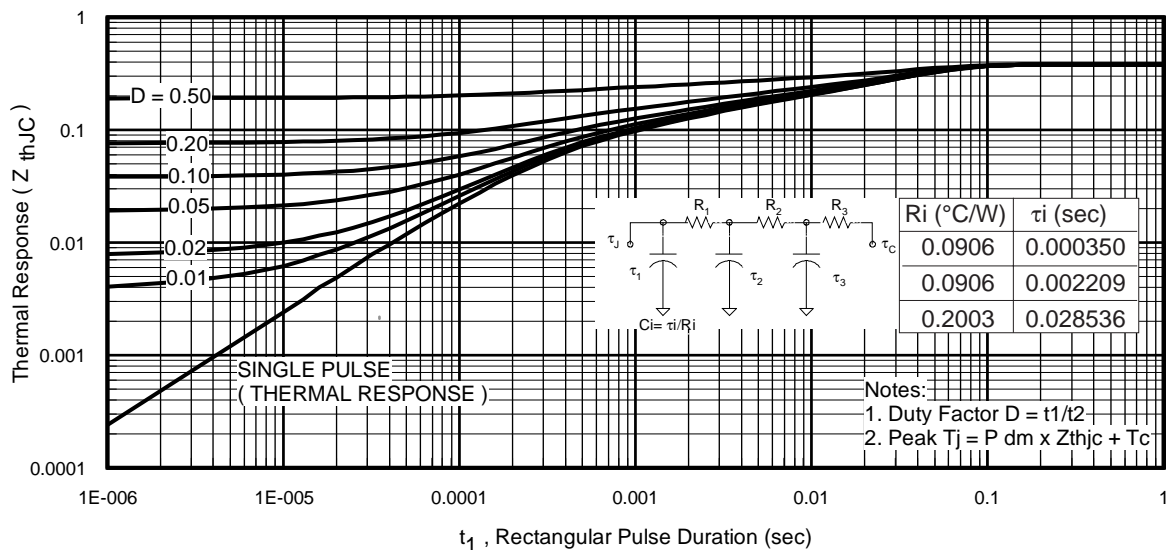


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

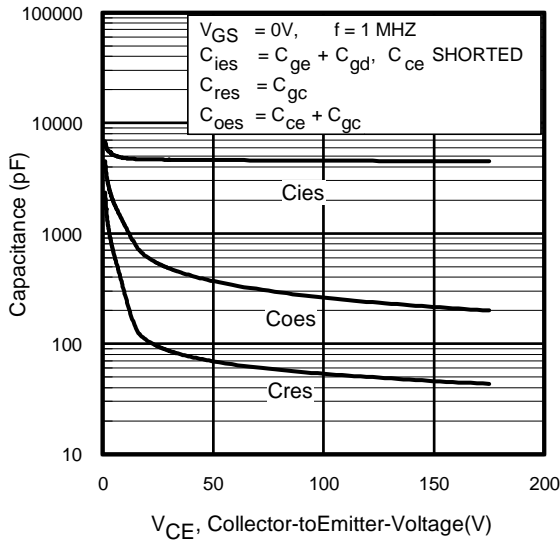


Fig. 7 - Typical Capacitance vs. Collector-to-Emitter Voltage

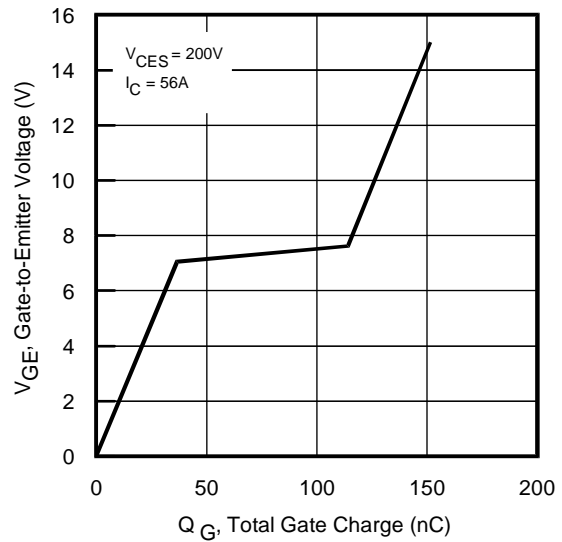


Fig. 8 - Typical Gate Charge vs. Gate-to-Emitter Voltage

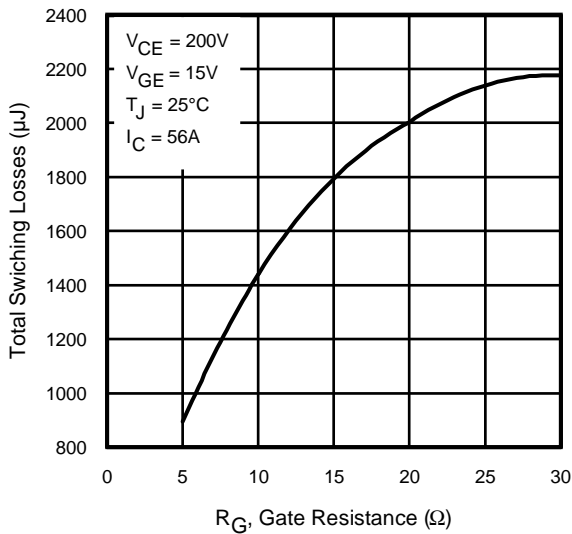


Fig. 9 - Typical Switching Losses vs. Gate Resistance

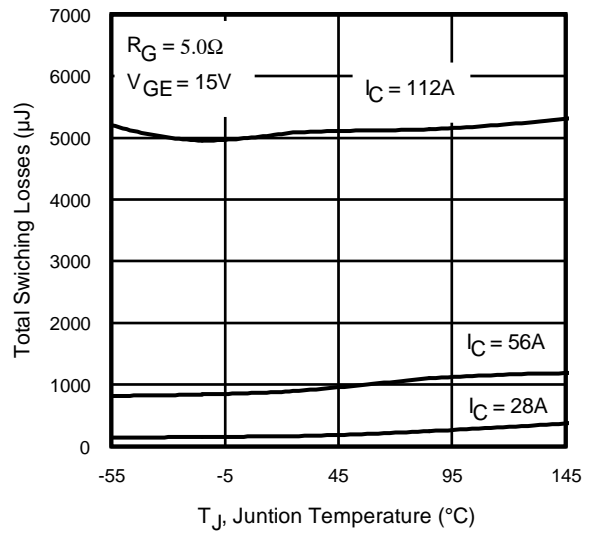


Fig. 10 - Typical Switching Losses vs. Junction Temperature

IRGP4050PbF

International
IR Rectifier

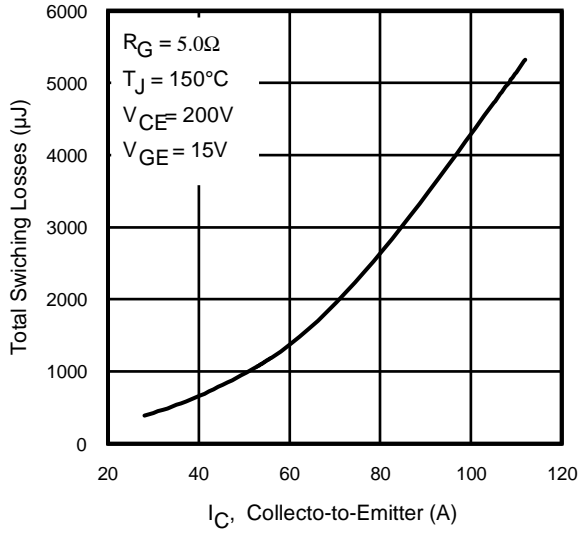


Fig. 11 - Typical Switching Losses vs. Collector-to-Emitter Current

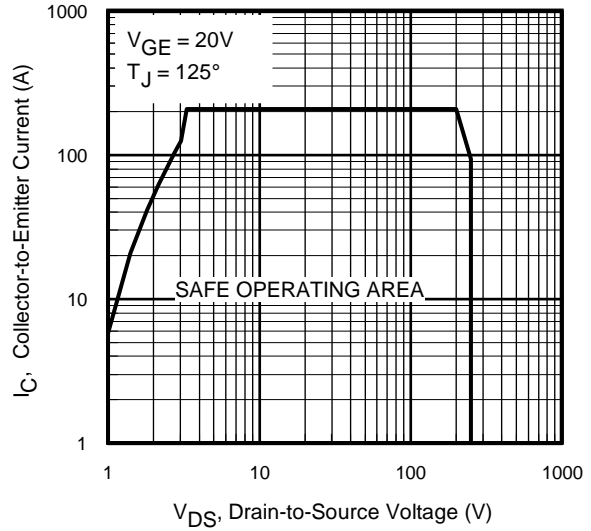


Fig. 12 - Turn-Off SOA

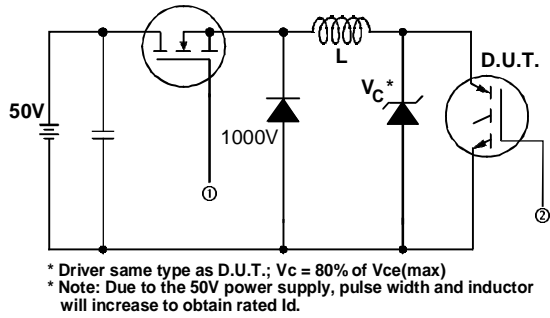


Fig. 13a - Clamped Inductive Load Test Circuit

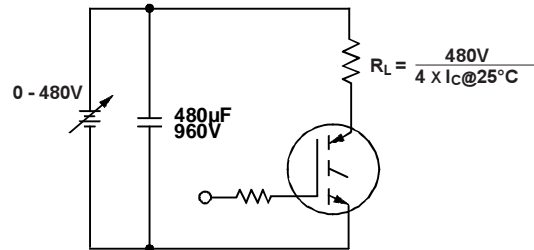


Fig. 13b - Pulsed Collector Current Test Circuit

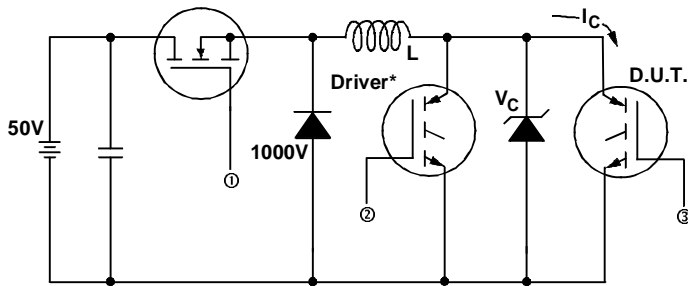


Fig. 14a - Switching Loss Test Circuit

* Driver same type as D.U.T., $V_c = 480V$

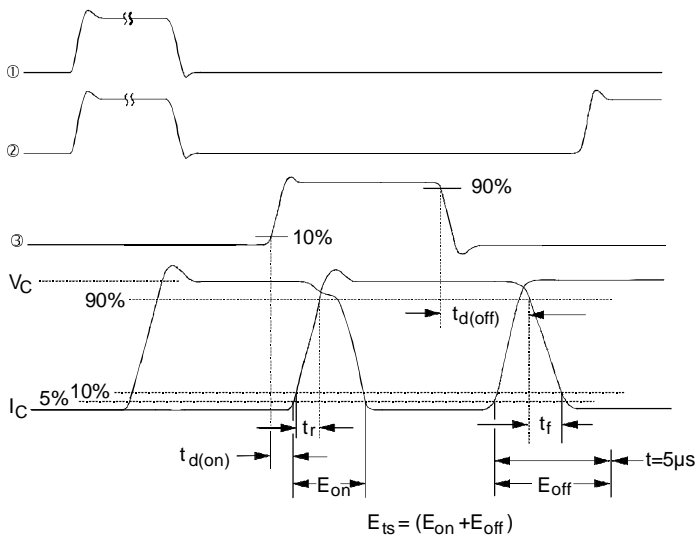
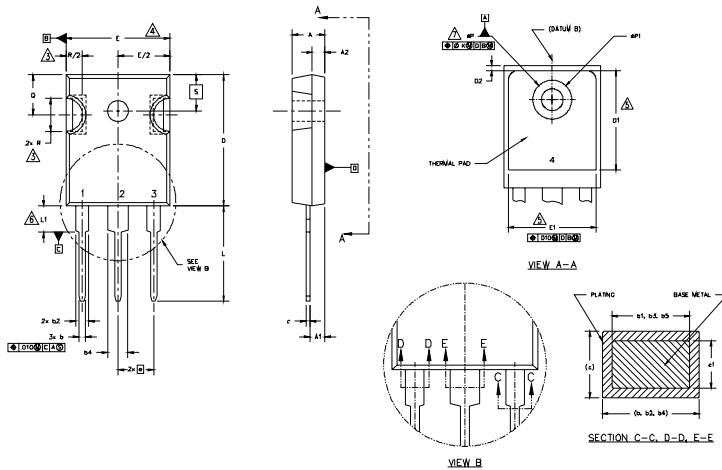


Fig. 14b - Switching Loss Waveforms

IRGP4050PbF

TO-247AC Package Outline

Dimensions are shown in millimeters (inches)



NOTES:

- DIMENSIONING AND TOLERANCING PER ASME Y14.5M 1994.
- DIMENSIONS ARE SHOWN IN INCHES (MILLIMETERS).
- CONTOUR OF SLOT OPTIONAL.
- 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.
- THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS D1 & E1.
- LEAD FINISH UNCONTROLLED IN LL.
- RP TO HAVE A MAXIMUM DRAFT ANGLE OF 1.5° TO THE TOP OF THE PART WITH A MAXIMUM HOLE DIAMETER OF .044" (1.118).
- OUTLINE CONFORMS TO JEDEC OUTLINE 10-247 WITH THE EXCEPTION OF DIMENSION C.

SYMBOL	INCHES		MILLIMETERS		NOTES
	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	
D	.039	.055	0.99	1.40	
D1	.039	.053	0.99	1.35	
D2	.060	.084	1.65	2.39	
D3	.060	.092	1.65	2.37	
D4	.102	.135	2.59	3.43	
D5	.102	.153	2.59	3.98	
E	.015	.034	0.38	0.86	
E1	.015	.030	0.38	0.76	
D	.776	.819	19.71	20.70	4
D1	.815	-	13.08	-	5
D2	.000	.039	0.01	0.98	
E	.602	.625	15.29	15.87	4
E1	.560	-	15.27	-	
A	.715 BSC		5.44 BSC		
W	.010		.254		
L1	.509	.634	14.20	16.10	
L1	.146	.169	3.71	4.29	
N	.762 BSC		19.35		
RP	.140	.144	3.56	3.66	
RP	-	.275	-	6.98	
D	.209	.224	5.31	5.69	
R	.178	.216	4.52	5.49	
S	.217 BSC		5.57 BSC		

LEAD ASSIGNMENTS

HEREFE

- GATE
- DRAIN
- SOURCE
- DRAIN

WIREL. SUPPLY

- GATE
- COLLECTOR
- EMITTER
- COLLECTOR

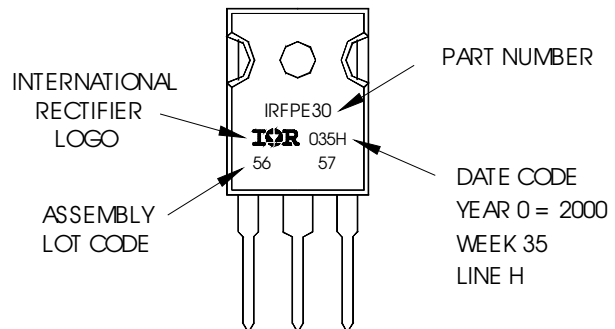
DIODES

- ANODE/OPEN
- CATHODE
- ANODE

TO-247AC Part Marking Information

EXAMPLE: THIS IS AN IRFP630
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-247AC package is not recommended for Surface Mount Application.

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



IR WORLD HEADQUARTERS: 233 Kansas St., El Segundo, California 90245, USA Tel: (310) 252-7105
TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information.08/04

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