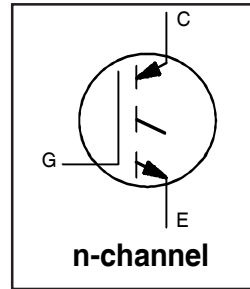


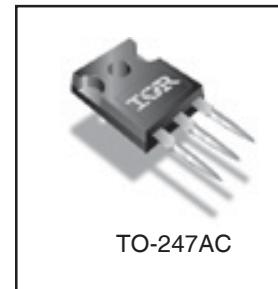
IRGP4050

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



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



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	Operating Junction and	-55 to +150	$^\circ C$
T_{STG}	Storage Temperature Range		
	Solder Temperature Range, for 10 sec.		

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.

Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	250	—	—	V $V_{GE} = 0V, I_C = 250\mu A$
$V_{(BR)ECS}$	Emitter-to-Collector Breakdown Voltage ④	18	—	—	V $V_{GE} = 0V, I_C = 1.0A$
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	8.2	—	mV/ $^\circ\text{C}$ $V_{GE} = 0V, I_C = 1mA$
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	1.64	1.90	V $I_C = 30A$ $I_C = 56A$ $V_{GE} = 15V$ $I_C = 104A, T_J = 150^\circ\text{C}$ See Fig. 2, 5
		—	2.04	—	
		—	2.60	—	
$V_{GE(th)}$	Gate Threshold Voltage	3.0	—	6.0	V $V_{CE} = V_{GE}, I_C = 250\mu A$
$\Delta V_{GE(th)}/\Delta T_J$	Threshold Voltage temp. coefficient	—	-11	—	mV/ $^\circ\text{C}$ $V_{CE} = V_{GE}, I_C = 0.25mA$
g_{fe}	Forward Transconductance ⑤	34	51	—	S $V_{CE} = 100V, I_C = 56A$
I_{CES}	Zero Gate Voltage Collector Current	—	—	250	μA $V_{GE} = 0V, V_{CE} = 250V$ $V_{GE} = 0V, V_{CE} = 10V$ $V_{GE} = 0V, V_{CE} = 250V, T_J = 150^\circ\text{C}$
		—	—	2.0	
		—	—	5000	
I_{GES}	Gate-to-Emitter Leakage Current	—	—	± 100	nA $V_{GE} = \pm 20V$

Switching Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge (turn-on)	—	230	350	nC $I_C = 56A$ $V_{CC} = 200V$ See Fig. 8 $V_{GE} = 15V$
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	37	56	
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	78	120	
$t_{d(on)}$	Turn-On delay time	—	37	—	ns $T_J = 25^\circ\text{C}$ $I_C = 30A, V_{CC} = 180V$ $V_{GE} = 15V, R_G = 5.0\Omega$ Energy losses include "tail" See Fig. 9, 10, 14
t_r	Rise time	—	35	—	
$t_{d(off)}$	Turn-Off delay time	—	120	180	
t_f	Fall time	—	59	89	
E_{on}	Turn-On Switching Loss	—	45	—	
E_{off}	Turn-Off Switching Loss	—	125	—	μJ $T_J = 150^\circ\text{C}$ $I_C = 30A, V_{CC} = 180V$ $V_{GE} = 15V, R_G = 5.0\Omega$ Energy losses include "tail" See Fig. 11, 14
E_{TS}	Total Switching Loss	—	170	—	
$t_{d(on)}$	Turn-On delay time	—	35	—	
t_r	Rise time	—	35	—	
$t_{d(off)}$	Turn-Off delay time	—	130	—	
t_f	Fall time	—	120	—	ns $T_J = 150^\circ\text{C}$ $I_C = 30A, V_{CC} = 180V$ $V_{GE} = 15V, R_G = 5.0\Omega$ Energy losses include "tail" See Fig. 11, 14
E_{TS}	Total Switching Loss	—	280	—	
L_E	Internal Emitter Inductance	—	13	—	
C_{ies}	Input Capacitance	—	4650	—	
C_{oes}	Output Capacitance	—	480	—	pF $V_{GE} = 0V$ $V_{CC} = 30V,$ See Fig. 7 $f = 1.0MHz$
C_{res}	Reverse Transfer Capacitance	—	92	—	

Notes:

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

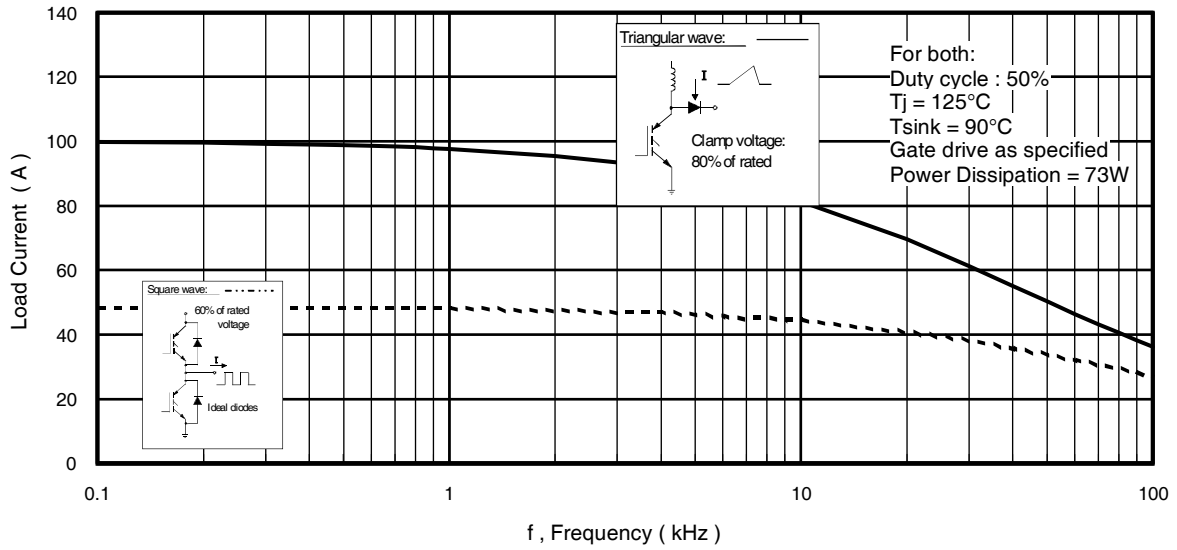


Fig. 1 - Typical Load Current vs. Frequency
(Load Current = I_{RMS} of fundamental)

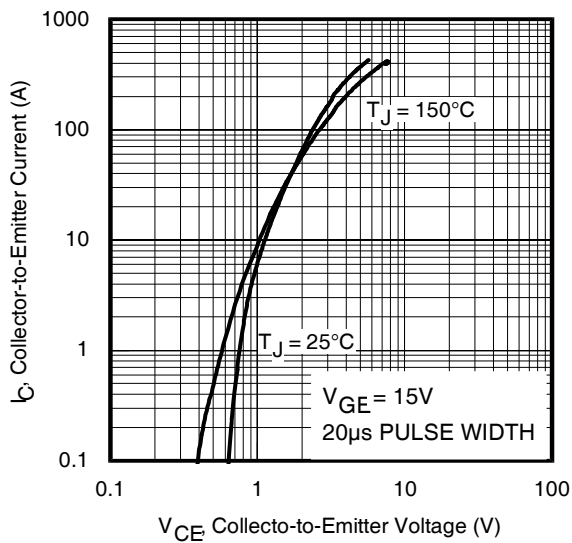


Fig. 2 - Typical Output Characteristics

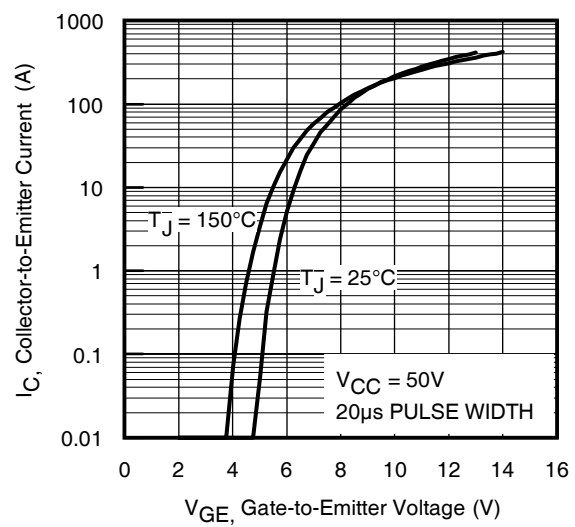


Fig. 3 - Typical Transfer Characteristics

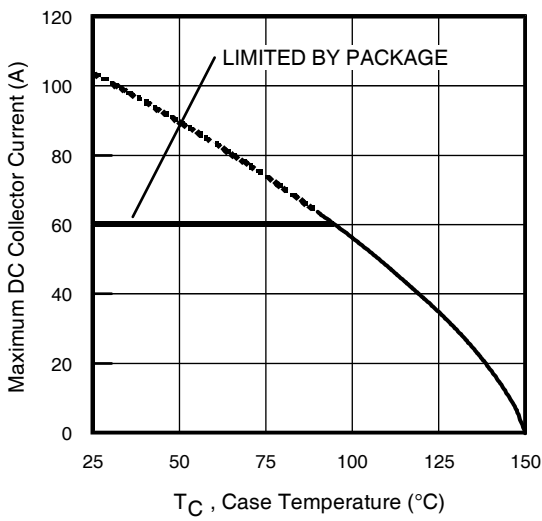


Fig. 4 - Maximum Collector Current vs. Case Temperature

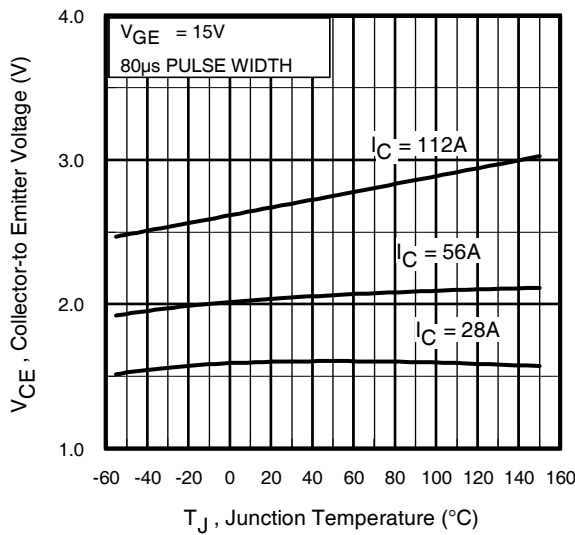


Fig. 5 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

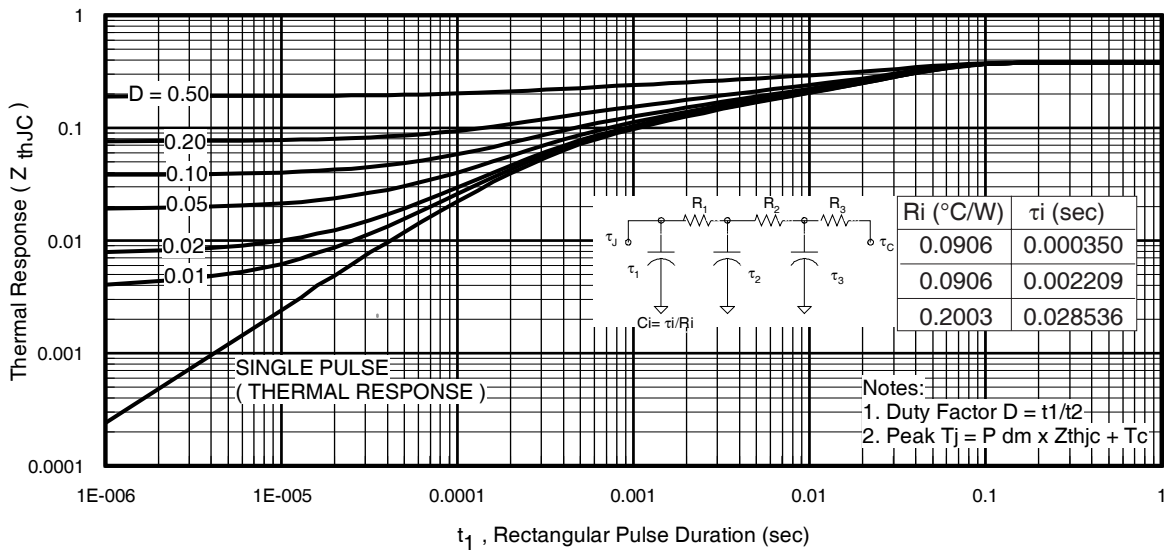


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

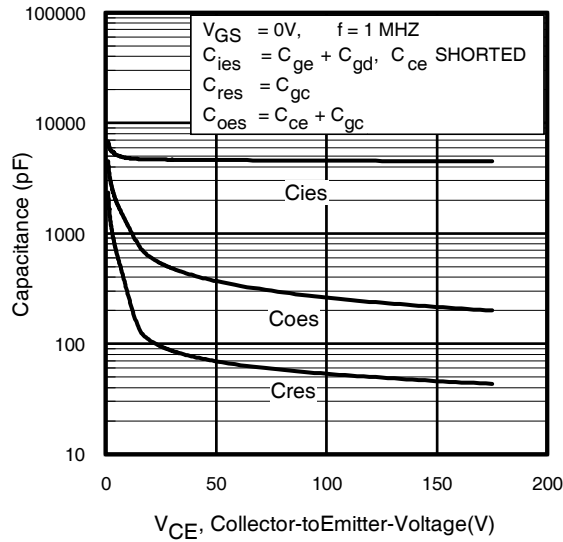


Fig. 7 - Typical Capacitance vs. Collector-to-Emitter Voltage

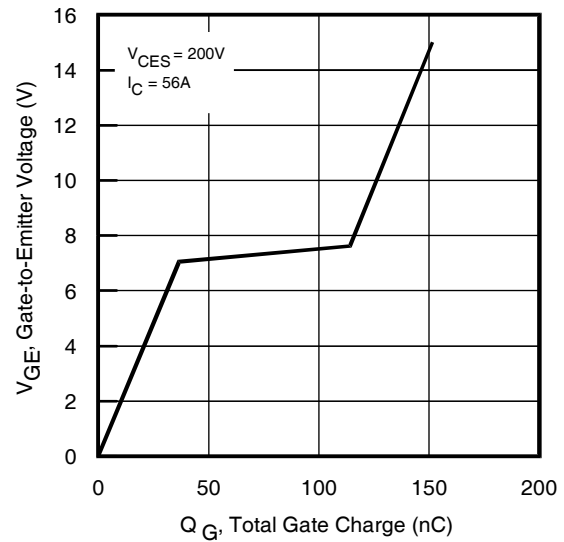


Fig. 8 - Typical Gate Charge vs. Gate-to-Emitter Voltage

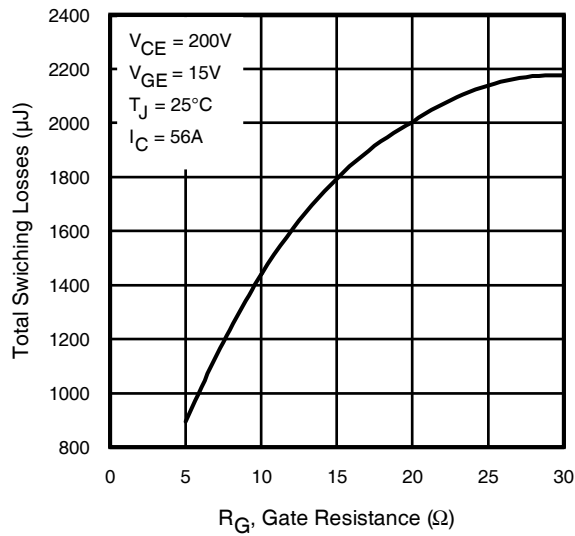


Fig. 9 - Typical Switching Losses vs. Gate Resistance

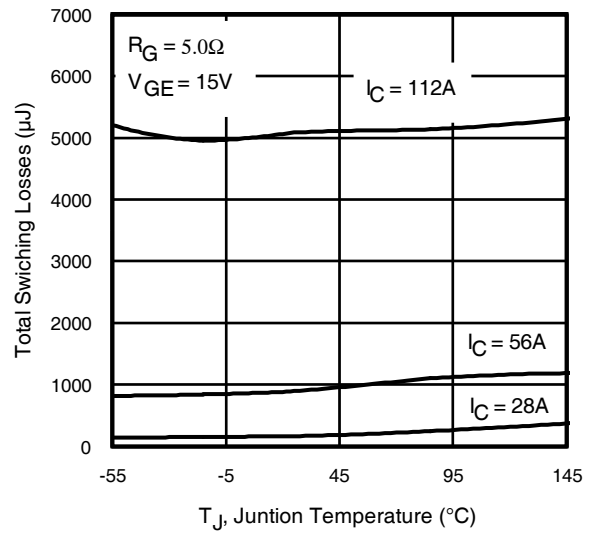


Fig. 10 - Typical Switching Losses vs. Junction Temperature

IRGP4050

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IR Rectifier

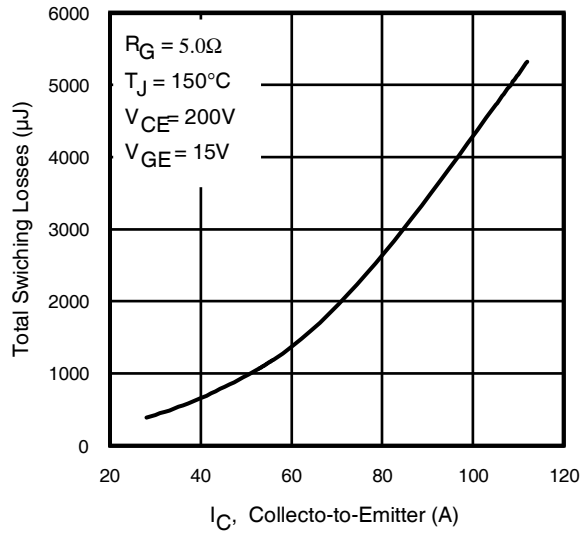


Fig. 11 - Typical Switching Losses vs. Collector-to-Emitter Current

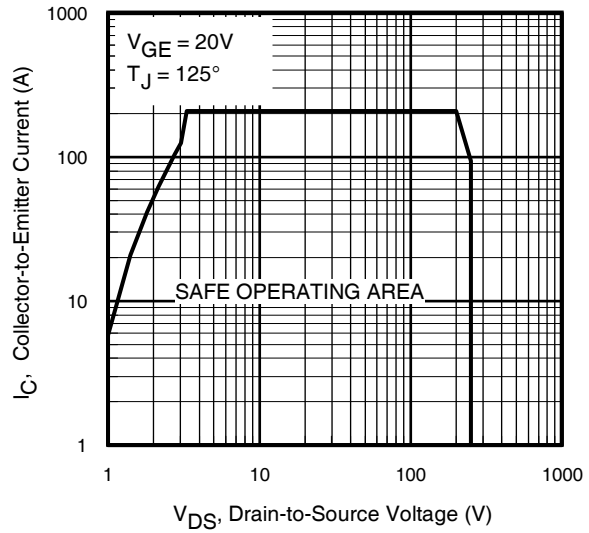


Fig. 12 - Turn-Off SOA

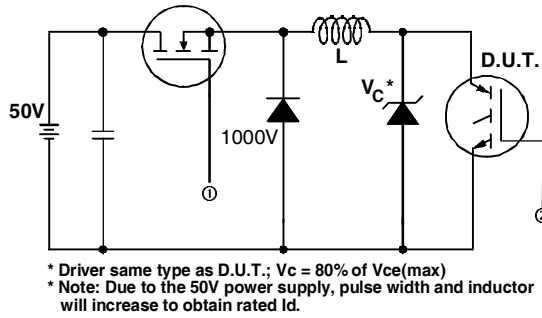


Fig. 13a - Clamped Inductive Load Test Circuit

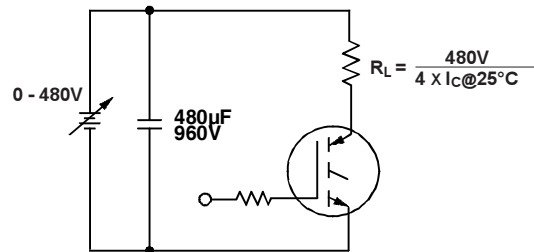


Fig. 13b - Pulsed Collector Current Test Circuit

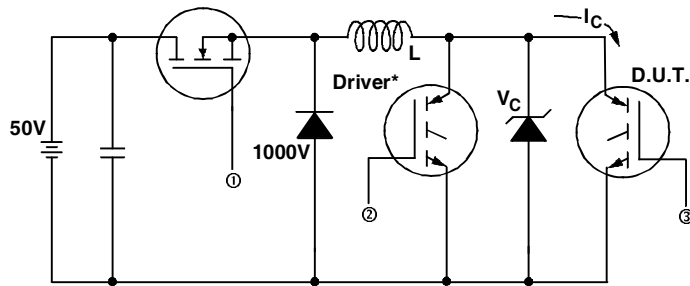


Fig. 14a - Switching Loss Test Circuit

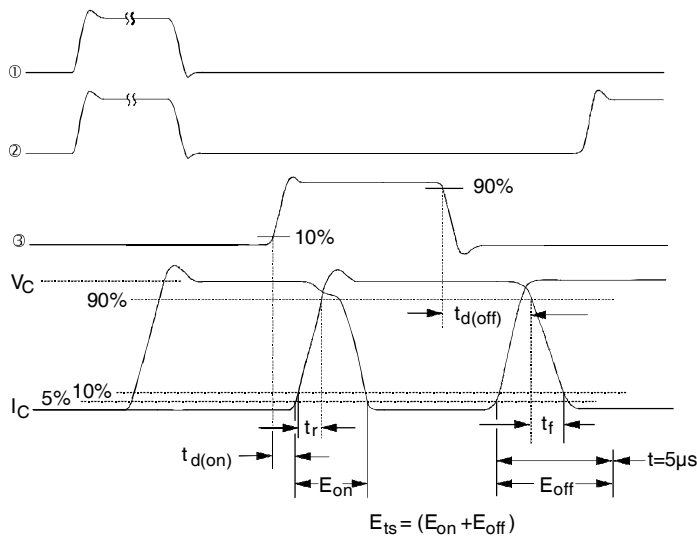


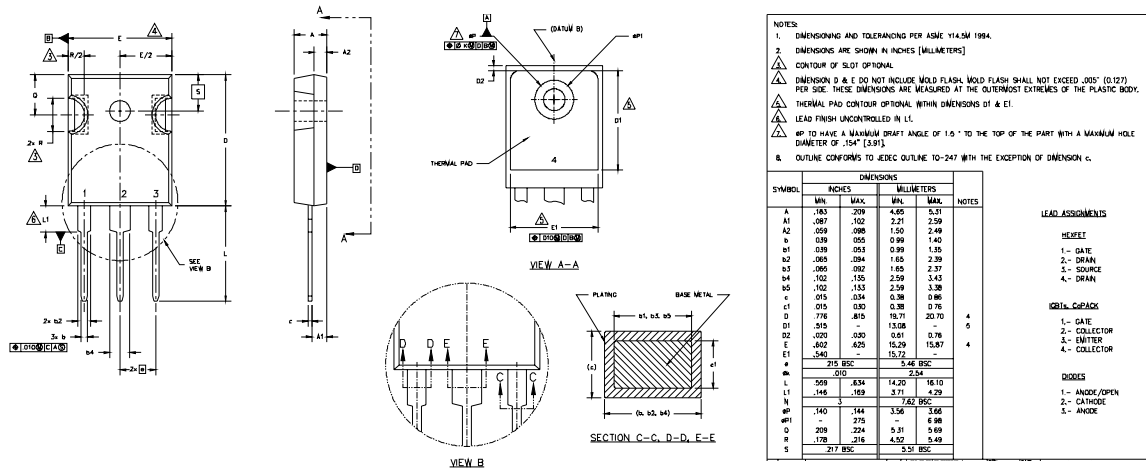
Fig. 14b - Switching Loss Waveforms

IRGP4050

TO-247AC Package Outline

Dimensions are shown in millimeters (inches)

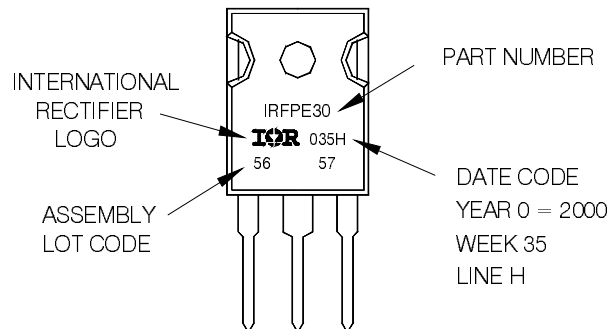
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TO-247AC Part Marking Information

EXAMPLE: THIS IS AN IRFPE30
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.

International
IR Rectifier

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TAC Fax: (310) 252-7903

Visit us at www.irf.com for sales contact information.06/04