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[International Rectifier \(Infineon Technologies Americas Corp.\)
IRGI4086PBF](#)

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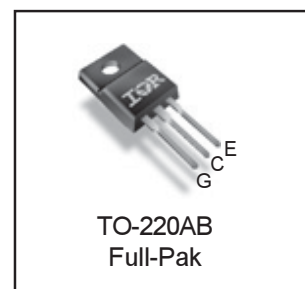
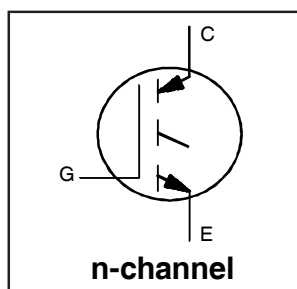
sales@integrated-circuit.com

PDP TRENCH IGBT

Features

- Advanced Trench IGBT Technology
- Optimized for Sustain and Energy Recovery Circuits in PDP Applications
- Low $V_{CE(on)}$ and Energy per Pulse (E_{PULSE}^{TM}) for Improved Panel Efficiency
- High Repetitive Peak Current Capability
- Lead Free Package

Key Parameters		
V_{CE} min	300	V
$V_{CE(ON)}$ typ. @ $I_C = 25A$	1.29	V
I_{RP} max @ $T_C = 25^\circ C$ ①	230	A
T_J max	150	$^\circ C$



G	C	E
Gate	Collector	Emitter

Description

This IGBT is specifically designed for applications in Plasma Display Panels. This device utilizes advanced trench IGBT technology to achieve low $V_{CE(on)}$ and low E_{PULSE}^{TM} rating per silicon area which improve panel efficiency. Additional features are 150 $^\circ C$ operating junction temperature and high repetitive peak current capability. These features combine to make this IGBT a highly efficient, robust and reliable device for PDP applications.

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{GE}	Gate-to-Emitter Voltage	± 30	V
I_C @ $T_C = 25^\circ C$	Continuous Collector Current, V_{GE} @ 15V	25	A
I_C @ $T_C = 100^\circ C$	Continuous Collector, V_{GE} @ 15V	12	
I_{RP} @ $T_C = 25^\circ C$	Repetitive Peak Current ①	230	
P_D @ $T_C = 25^\circ C$	Power Dissipation	43	W
P_D @ $T_C = 100^\circ C$	Power Dissipation	17	
	Linear Derating Factor	0.34	W/ $^\circ C$
T_J	Operating Junction and	-40 to + 150	$^\circ C$
T_{STG}	Storage Temperature Range		
	Soldering Temperature for 10 seconds	300	
	Mounting Torque, 6-32 or M3 Screw	10lb·in (1.1N·m)	N

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case②	—	2.9	$^\circ C/W$

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{CES}	Collector-to-Emitter Breakdown Voltage	300	—	—	V	$V_{GE} = 0V, I_{CE} = 1\text{ mA}$
$\Delta BV_{CES}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.29	—	V/ $^\circ\text{C}$	Reference to $25^\circ\text{C}, I_{CE} = 1\text{ mA}$
$V_{CE(on)}$	Static Collector-to-Emitter Voltage	—	1.10	1.36	V	$V_{GE} = 15V, I_{CE} = 12A$ ③
		—	1.29	1.55		$V_{GE} = 15V, I_{CE} = 25A$ ③
		—	1.49	1.67		$V_{GE} = 15V, I_{CE} = 40A$ ③
		—	1.90	2.10		$V_{GE} = 15V, I_{CE} = 70A$ ③
		—	2.57	2.96		$V_{GE} = 15V, I_{CE} = 120A$ ③
		—	2.27	—		$V_{GE} = 15V, I_{CE} = 70A, T_J = 150^\circ\text{C}$
$V_{GE(th)}$	Gate Threshold Voltage	2.6	—	5.0	V	$V_{CE} = V_{GE}, I_{CE} = 500\mu\text{A}$
$\Delta V_{GE(th)}/\Delta T_J$	Gate Threshold Voltage Coefficient	—	-11	—	mV/ $^\circ\text{C}$	
I_{CES}	Collector-to-Emitter Leakage Current	—	2.0	25	μA	$V_{CE} = 300V, V_{GE} = 0V$
		—	5.0	—		$V_{CE} = 300V, V_{GE} = 0V, T_J = 100^\circ\text{C}$
		—	100	—		$V_{CE} = 300V, V_{GE} = 0V, T_J = 150^\circ\text{C}$
I_{GES}	Gate-to-Emitter Forward Leakage	—	—	100	nA	$V_{GE} = 30V$
	Gate-to-Emitter Reverse Leakage	—	—	-100		$V_{GE} = -30V$
g_{fe}	Forward Transconductance	—	29	—	S	$V_{CE} = 25V, I_{CE} = 25A$
Q_g	Total Gate Charge	—	65	—	nC	$V_{CE} = 200V, I_C = 25A, V_{GE} = 15V$ ③
Q_{gc}	Gate-to-Collector Charge	—	22	—		
$t_{d(on)}$	Turn-On delay time	—	36	—	ns	$I_C = 25A, V_{CC} = 196V$ $R_G = 10\Omega, L = 200\mu\text{H}, L_S = 200\text{ nH}$ $T_J = 25^\circ\text{C}$
t_r	Rise time	—	31	—		
$t_{d(off)}$	Turn-Off delay time	—	112	—		
t_f	Fall time	—	65	—		
$t_{d(on)}$	Turn-On delay time	—	30	—	ns	$I_C = 25A, V_{CC} = 196V$ $R_G = 10\Omega, L = 200\mu\text{H}, L_S = 200\text{ nH}$ $T_J = 150^\circ\text{C}$
t_r	Rise time	—	33	—		
$t_{d(off)}$	Turn-Off delay time	—	145	—		
t_f	Fall time	—	98	—		
t_{st}	Shoot Through Blocking Time	100	—	—	ns	$V_{CC} = 240V, V_{GE} = 15V, R_G = 5.1\Omega$
E_{PULSE}	Energy per Pulse	—	1075	—	μJ	$L = 220\text{ nH}, C = 0.40\mu\text{F}, V_{GE} = 15V$ $V_{CC} = 240V, R_G = 5.1\Omega, T_J = 25^\circ\text{C}$
		—	1432	—		$L = 220\text{ nH}, C = 0.40\mu\text{F}, V_{GE} = 15V$ $V_{CC} = 240V, R_G = 5.1\Omega, T_J = 100^\circ\text{C}$
C_{iss}	Input Capacitance	—	2250	—	pF	$V_{GE} = 0V$
C_{oss}	Output Capacitance	—	110	—		$V_{CE} = 30V$
C_{rss}	Reverse Transfer Capacitance	—	58	—		$f = 1.0\text{ MHz}$, See Fig.13
L_C	Internal Collector Inductance	—	5.0	—	nH	Between lead, 6mm (0.25in.)
L_E	Internal Emitter Inductance	—	13	—		from package and center of die contact

Notes:

- ① Half sine wave with duty cycle = 0.1, $t_{on} = 2\mu\text{sec}$.
 ② R_θ is measured at T_J of approximately 90°C .

③ Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.

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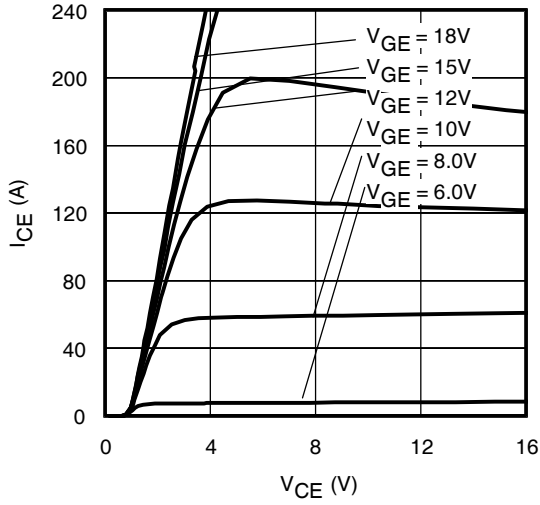


Fig 1. Typical Output Characteristics @ 25°C

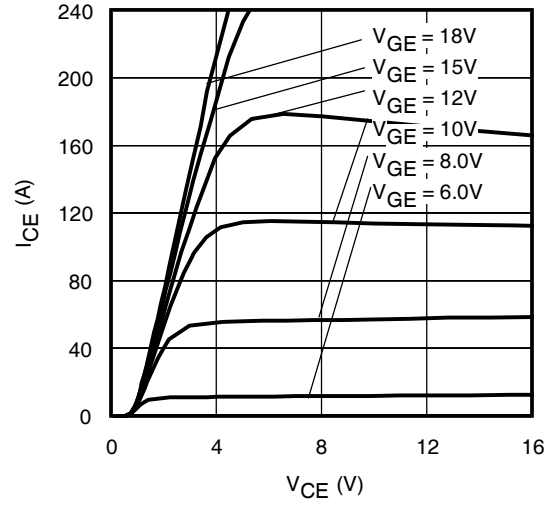


Fig 2. Typical Output Characteristics @ 75°C

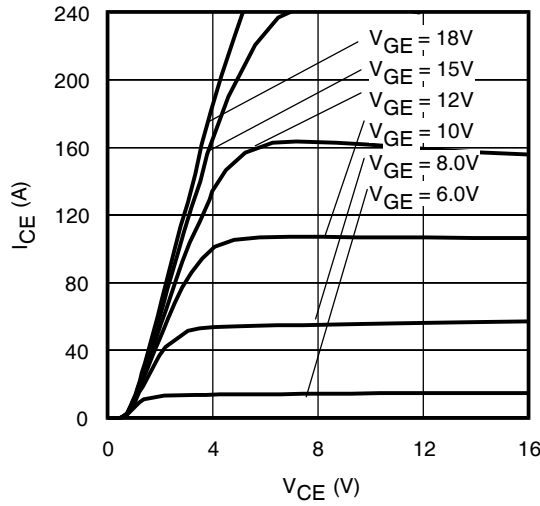


Fig 3. Typical Output Characteristics @ 125°C

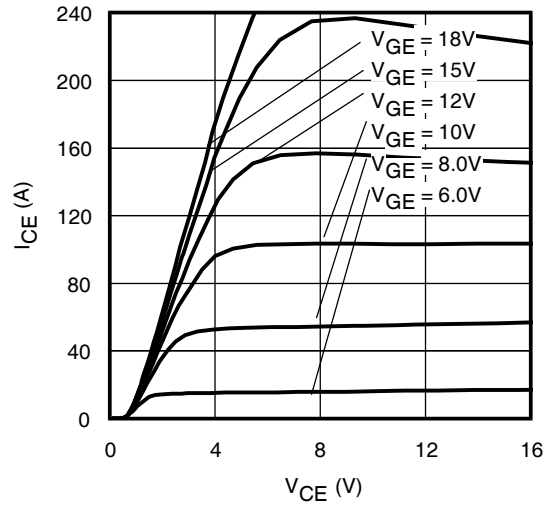


Fig 4. Typical Output Characteristics @ 150°C

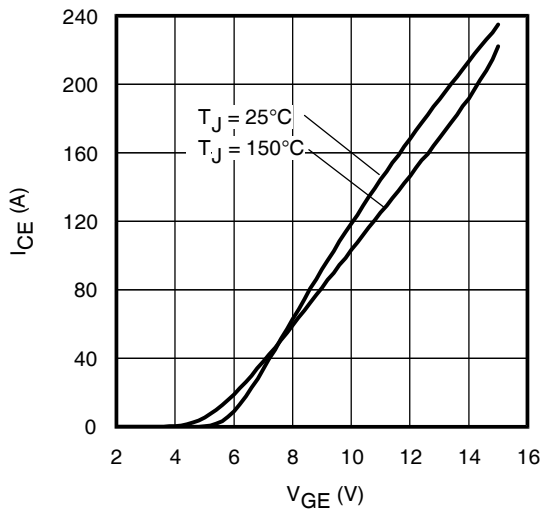


Fig 5. Typical Transfer Characteristics

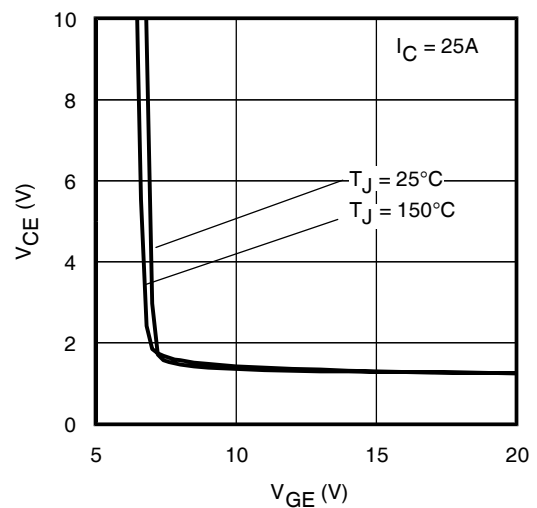


Fig 6. $V_{CE(ON)}$ vs. Gate Voltage

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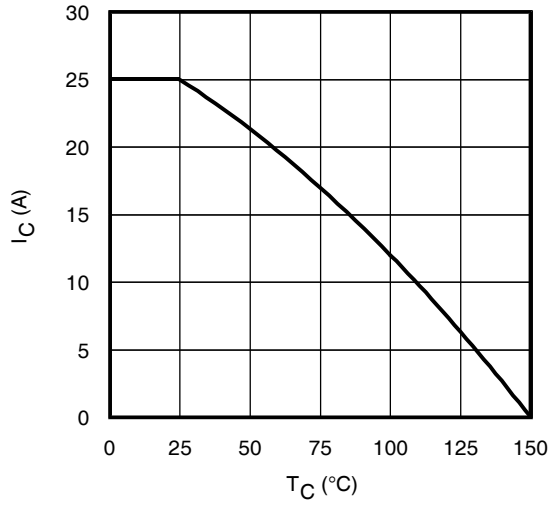


Fig 7. Maximum Collector Current vs. Case Temperature

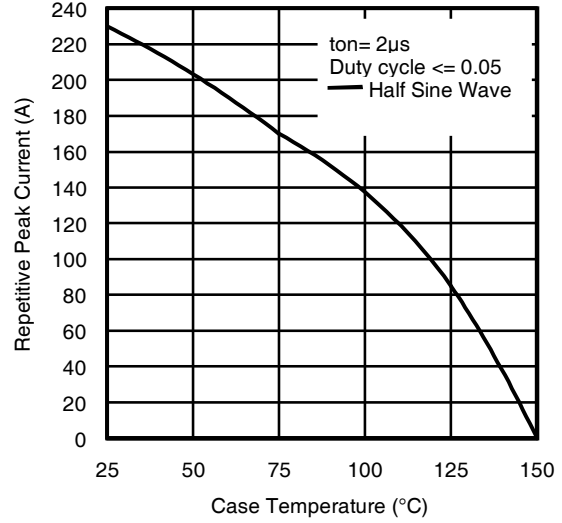


Fig 8. Typical Repetitive Peak Current vs. Case Temperature

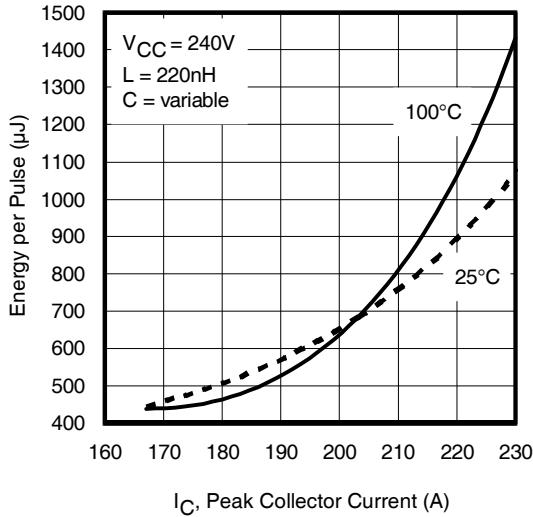


Fig 9. Typical EPULSE vs. Collector Current

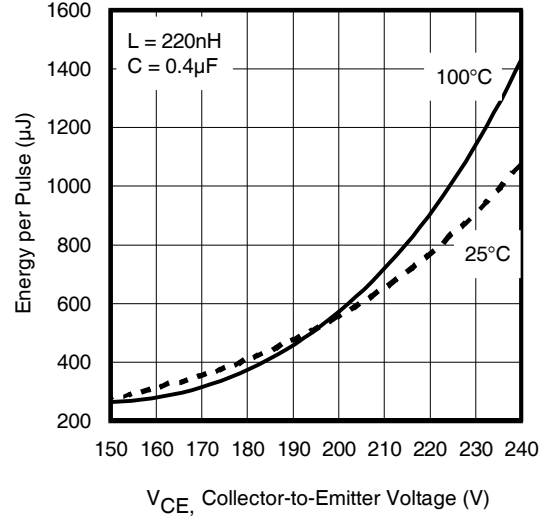


Fig 10. Typical EPULSE vs. Collector-to-Emitter Voltage

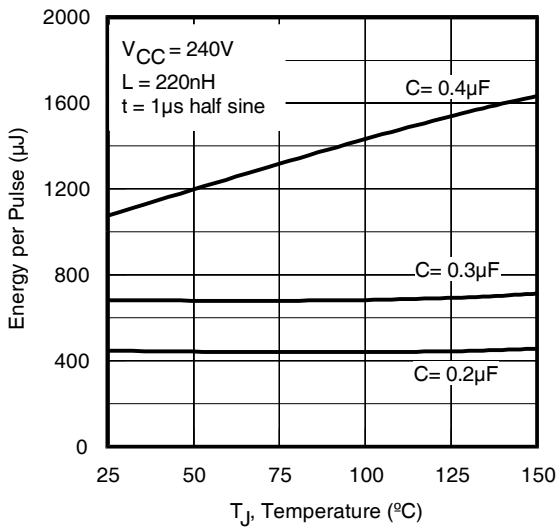


Fig 11. EPULSE vs. Temperature

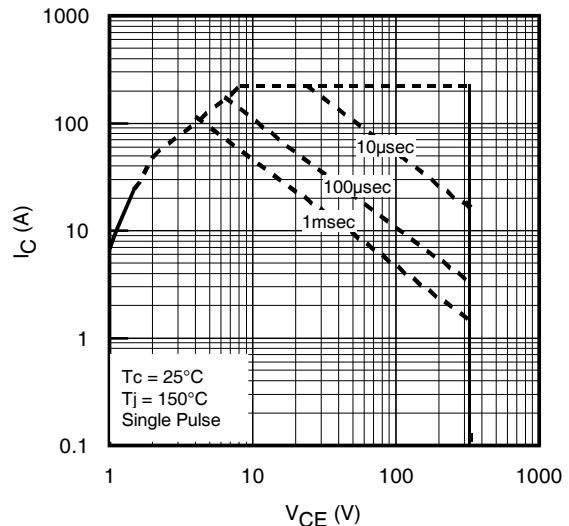


Fig 12. Forward Bias Safe Operating Area

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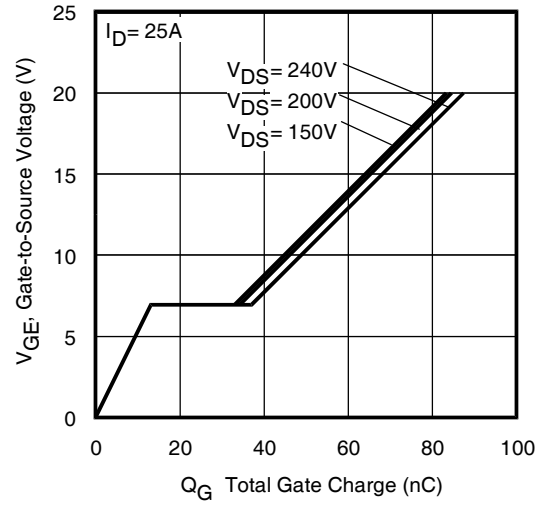
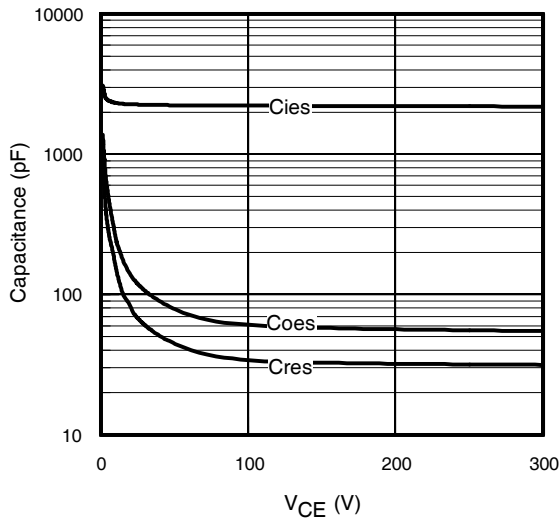


Fig 13. Typical Capacitance vs. Collector-to-Emitter Voltage

Fig 14. Typical Gate Charge vs. Gate-to-Source Voltage

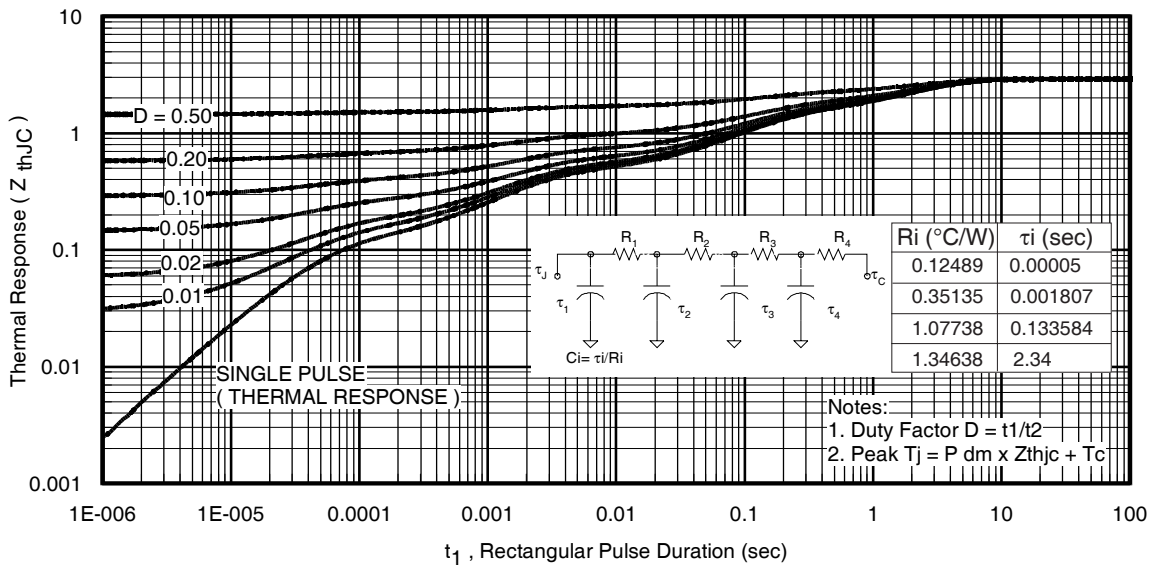


Fig 15. Maximum Effective Transient Thermal Impedance, Junction-to-Case (IGBT)

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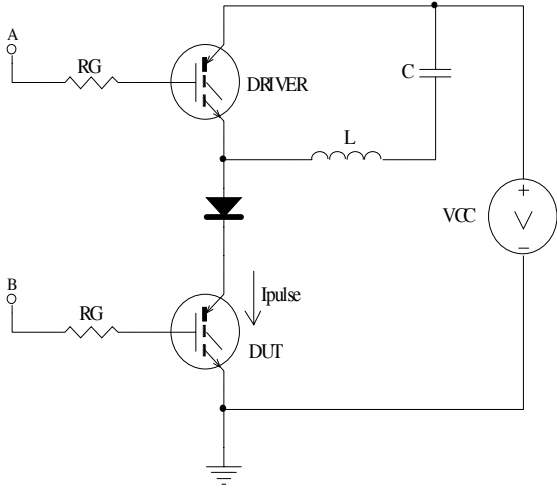


Fig 16a. t_{st} and E_{PULSE} Test Circuit

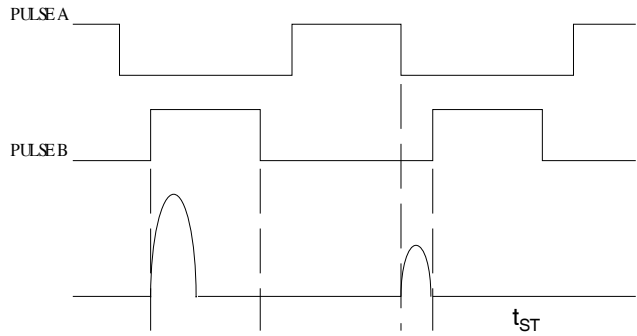


Fig 16b. t_{st} Test Waveforms

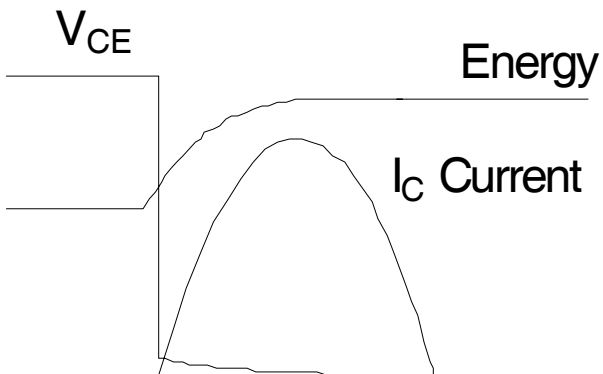


Fig 16c. E_{PULSE} Test Waveforms

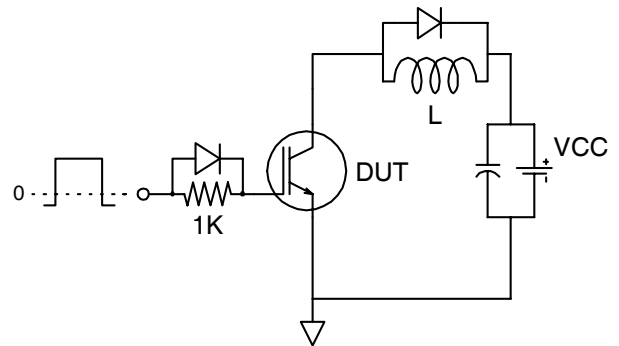
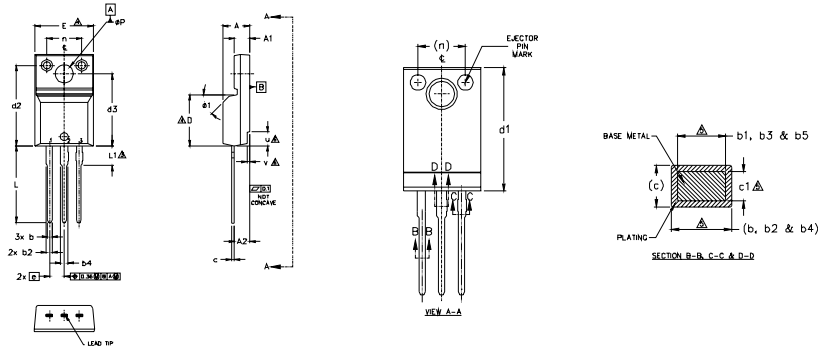


Fig. 17 - Gate Charge Circuit (turn-off)

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TO-220 Full-Pak Package Outline

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Dimensions are shown in millimeters (inches)



SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.57	4.83	.180	.190	1.0 DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994. 2.0 DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES]. 3.0 LEAD DIMENSION AND FINISH UNCONTROLLED IN L1. 4.0 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTER MOST EXTREMES OF THE PLASTIC BODY. 5.0 DIMENSION b1, b3, b5 & c1 APPLY TO BASE METAL ONLY. 6.0 STEP OPTIONAL ON PLASTIC BODY DEFINED BY DIMENSIONS u & v. 7.0 CONTROLLING DIMENSION ; INCHES.
A1	2.57	2.83	.101	.111	
b	0.61	0.94	.024	.037	
b1	0.61	0.89	.024	.035	
b2	0.76	1.27	.030	.050	
b3	0.76	1.22	.030	.048	
b4	1.02	1.52	.040	.060	
b5	1.02	1.47	.040	.058	
c	0.33	0.63	.013	.025	
c1	0.33	0.58	.013	.023	
D	8.66	9.80	.341	.386	4
d1	15.80	16.13	.622	.635	
d2	13.97	14.22	.550	.560	5
d3	12.30	12.93	.484	.509	
E	9.63	10.75	.379	.423	4
e	2.54	BSC	.100	BSC	
L	13.20	13.72	.520	.540	3
L1	3.57	3.67	.122	.145	
n	6.05	6.60	.238	.260	6
øP	3.05	3.45	.120	.136	
u	2.40	2.50	.094	.098	6
v	0.40	0.50	.016	.020	
ø1	-	45°	-	45°	

NOTES:
 1.0 DIMENSIONING AND TOLERANCING AS PER ASME Y14.5 M- 1994.
 2.0 DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
 3.0 LEAD DIMENSION AND FINISH UNCONTROLLED IN L1.
 4.0 DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED .005" (0.127) PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTER MOST EXTREMES OF THE PLASTIC BODY.
 5.0 DIMENSION b1, b3, b5 & c1 APPLY TO BASE METAL ONLY.
 6.0 STEP OPTIONAL ON PLASTIC BODY DEFINED BY DIMENSIONS u & v.
 7.0 CONTROLLING DIMENSION ; INCHES.

LEAD ASSIGNMENTS

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

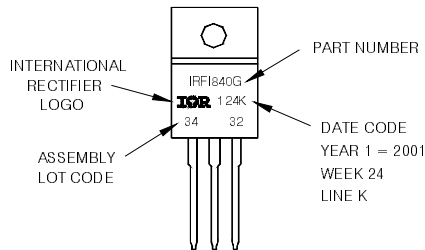
IGBTs, CoPACK

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

TO-220 Full-Pak Part Marking Information

EXAMPLE: THIS IS AN IRFI840G
 WITH ASSEMBLY
 LOT CODE 3432
 ASSEMBLED ON WW 24, 2001
 IN THE ASSEMBLY LINE 'K'

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



TO-220AB Full-Pak 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/>

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 This product has been designed for the Industrial market.
 Qualification Standards can be found on IR's Web site.