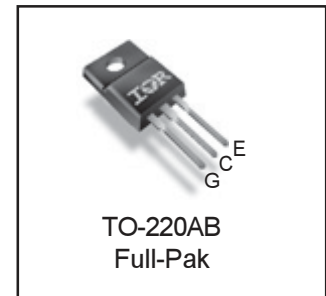
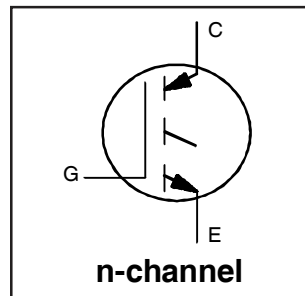


PDP TRENCH IGBT

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		
	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	$^\circ C/W$

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°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	—		
t_r	Rise time	—	31	—	ns	$I_C = 25A, V_{CC} = 196V$ $R_G = 10\Omega, L = 200\mu\text{H}, L_S = 200\text{ nH}$ $T_J = 25^\circ\text{C}$
$t_{d(off)}$	Turn-Off delay time	—	112	—		
t_f	Fall time	—	65	—		
$t_{d(on)}$	Turn-On delay time	—	30	—		
t_r	Rise time	—	33	—	ns	$I_C = 25A, V_{CC} = 196V$ $R_G = 10\Omega, L = 200\mu\text{H}, L_S = 200\text{ nH}$ $T_J = 150^\circ\text{C}$
$t_{d(off)}$	Turn-Off delay time	—	145	—		
t_f	Fall time	—	98	—		
t_{st}	Shoot Through Blocking Time	100	—	—		
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
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 $\leq 2\%$.

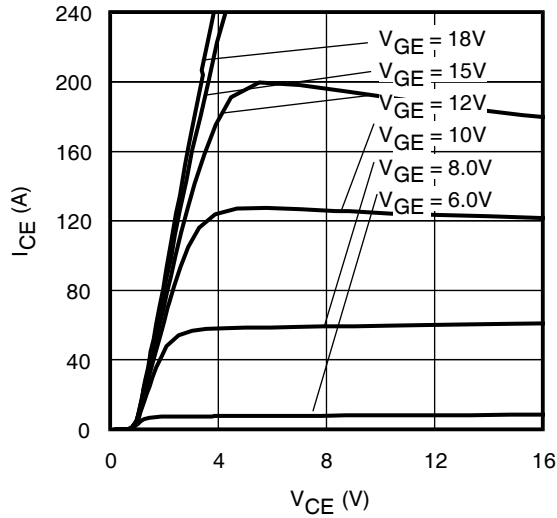


Fig 1. Typical Output Characteristics @ 25°C

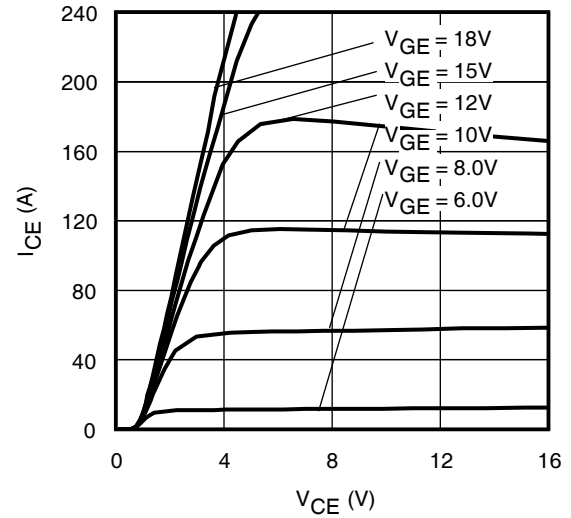


Fig 2. Typical Output Characteristics @ 75°C

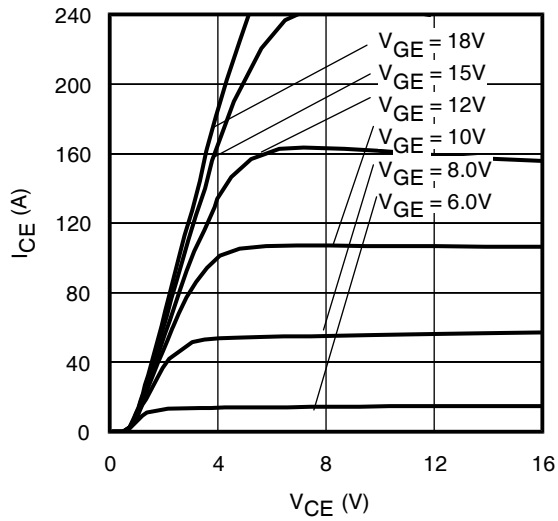


Fig 3. Typical Output Characteristics @ 125°C

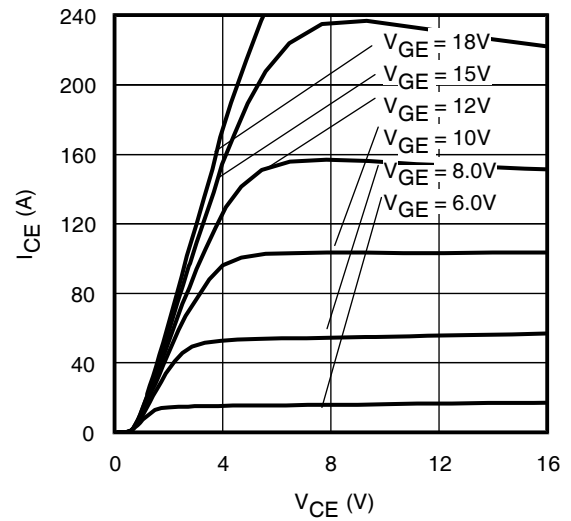


Fig 4. Typical Output Characteristics @ 150°C

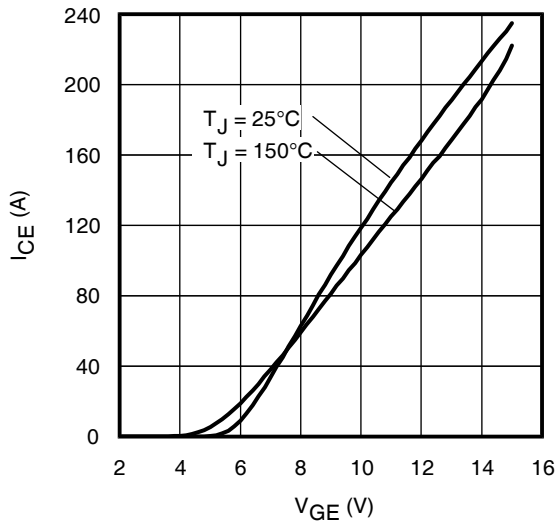


Fig 5. Typical Transfer Characteristics

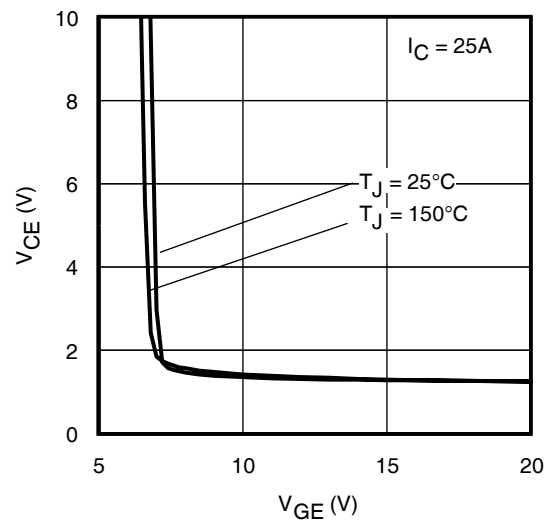


Fig 6. $V_{CE(ON)}$ vs. Gate Voltage

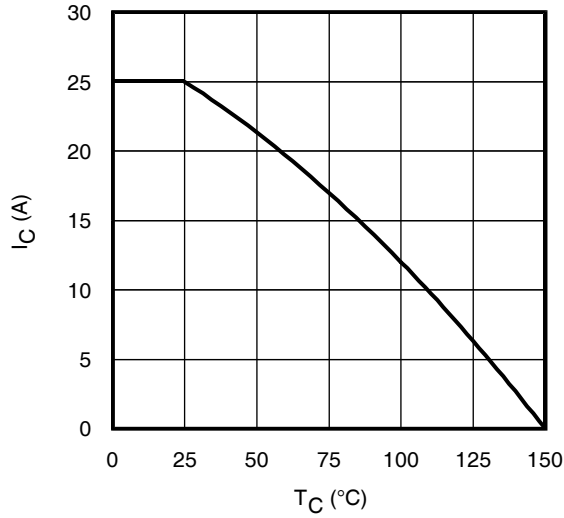


Fig 7. Maximum Collector Current vs. Case Temperature

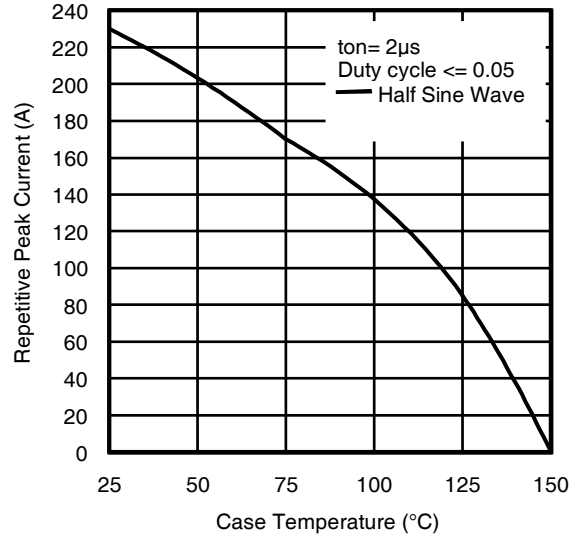


Fig 8. Typical Repetitive Peak Current vs. Case Temperature

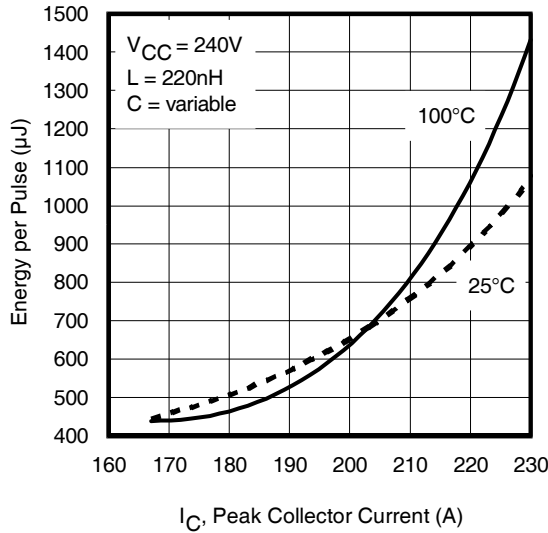


Fig 9. Typical E_{PULSE} vs. Collector Current

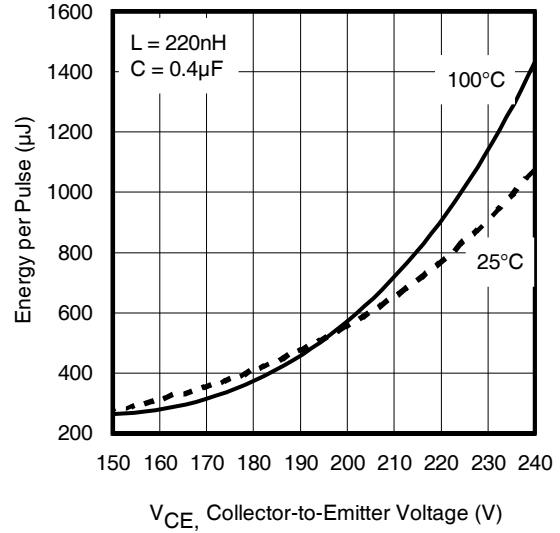


Fig 10. Typical E_{PULSE} vs. Collector-to-Emitter Voltage

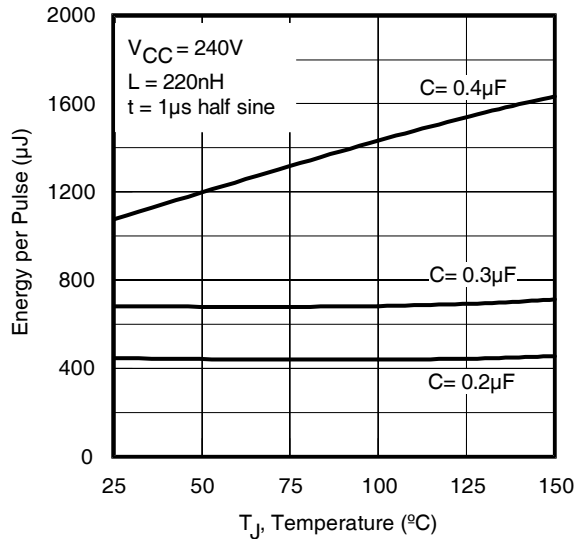


Fig 11. E_{PULSE} vs. Temperature

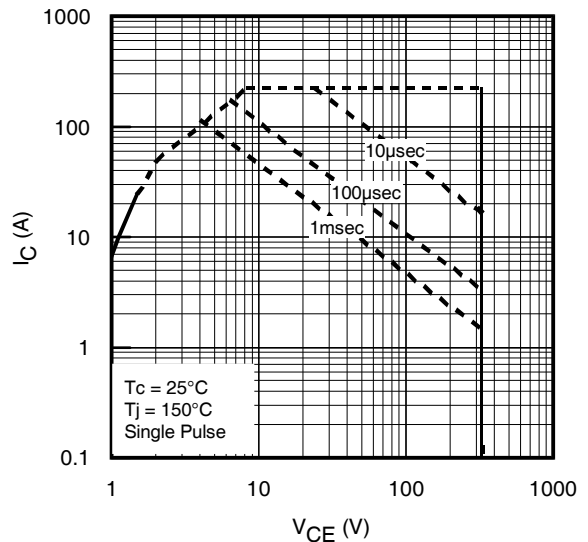


Fig 12. Forward Bias Safe Operating Area

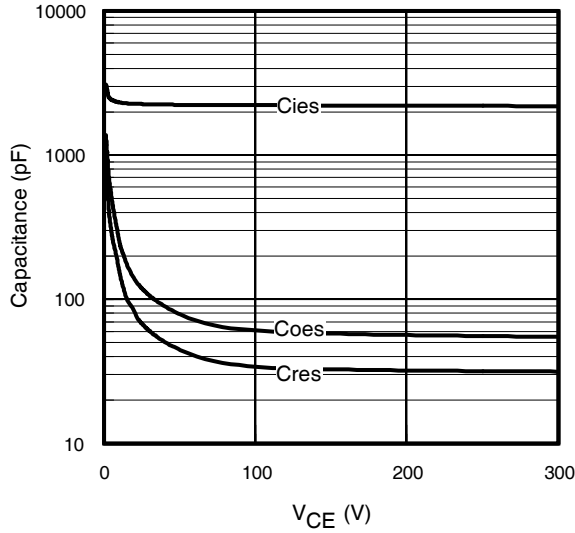


Fig 13. Typical Capacitance vs. Collector-to-Emitter Voltage

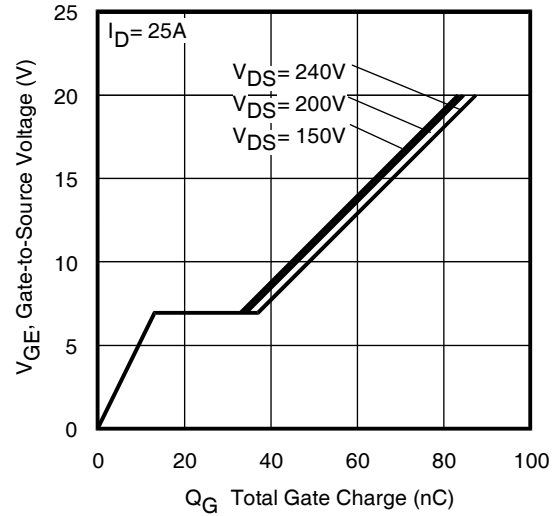


Fig 14. Typical Gate Charge vs. Gate-to-Source Voltage

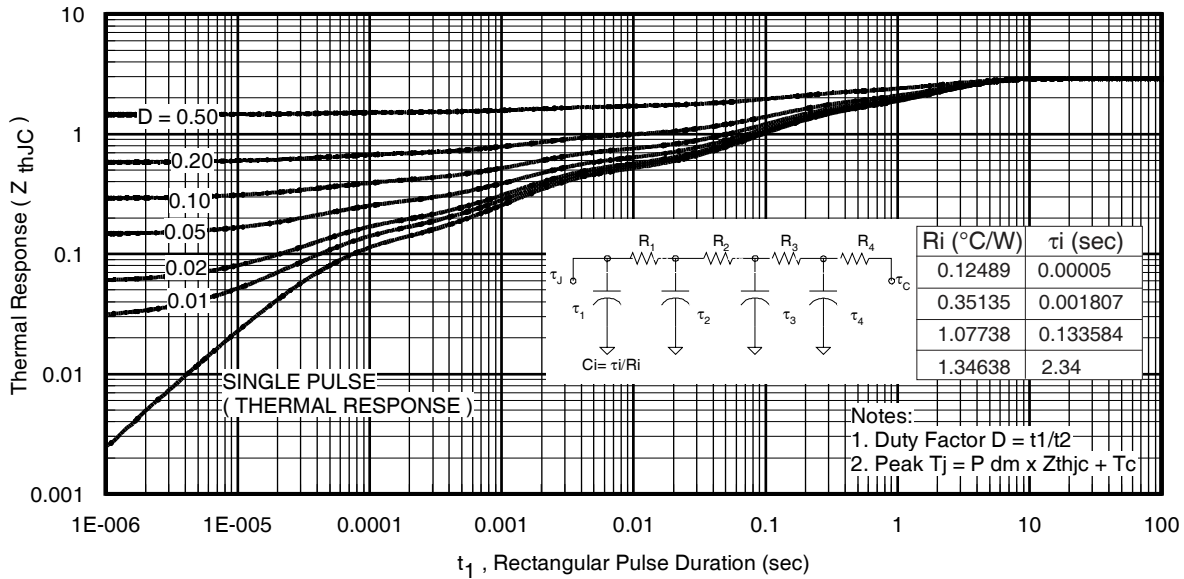


Fig 15. Maximum Effective Transient Thermal Impedance, Junction-to-Case (IGBT)

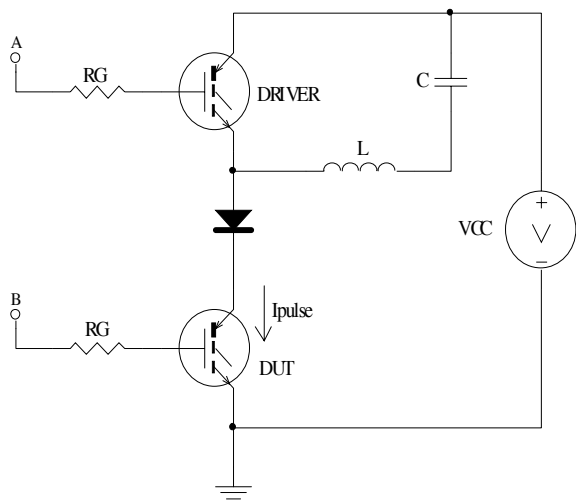


Fig 16a. t_{st} and E_{PULSE} Test Circuit

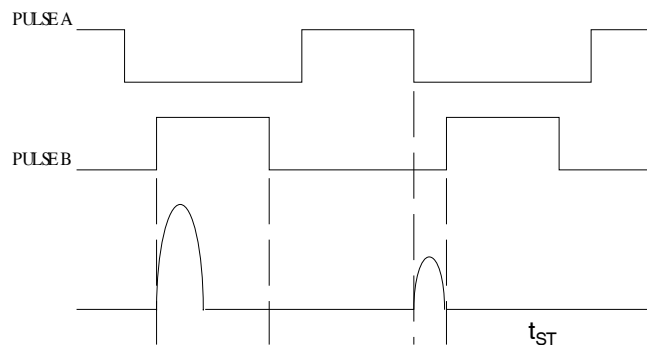


Fig 16b. t_{st} Test Waveforms

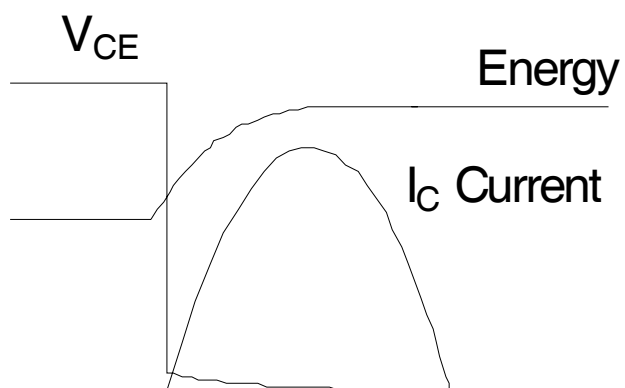


Fig 16c. E_{PULSE} Test Waveforms

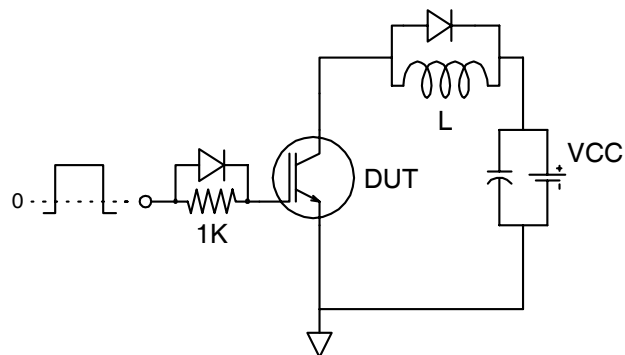
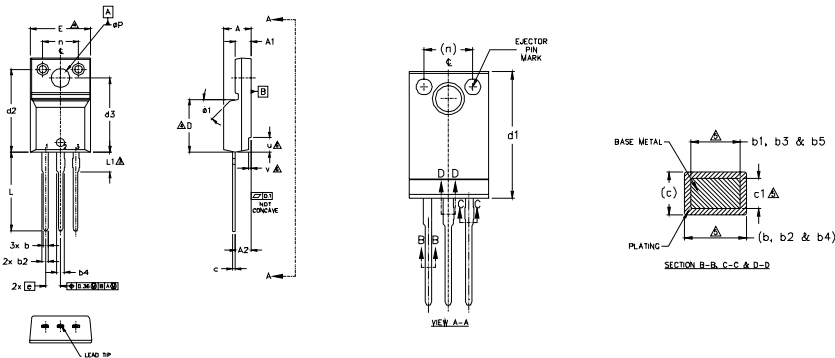


Fig. 17 - Gate Charge Circuit (turn-off)

TO-220 Full-Pak Package Outline

Dimensions are shown in millimeters (inches)



SYMBOL	DIMENSIONS				UNIT
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.57	4.83	.180	.190	5
A1	2.57	2.83	.101	.111	
A2	2.51	2.93	.099	.115	
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	16.15	.622	.635	4
d2	13.97	14.22	.550	.560	
d3	12.30	12.93	.484	.509	4
E	9.63	10.75	.379	.423	
e	2.54 BSC		.100 BSC		3
L	13.20	13.72	.520	.540	
L1	3.37	3.67	.122	.145	3
L2	6.05	6.60	.238	.260	
n	3.05	3.45	.120	.136	6
φP	2.40	2.50	.094	.098	
v	0.40	0.50	.016	.020	6
φ1	-	.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

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

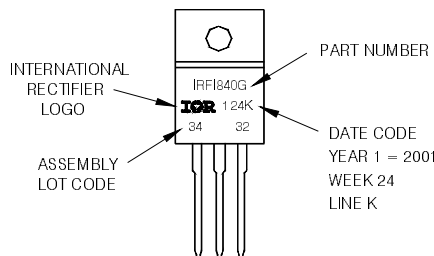
IGBTs CoPACK

- 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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