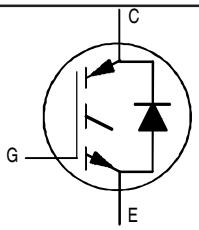
International
IOR Rectifier

IRGIB7B60KDPbF

INSULATED GATE BIPOLAR TRANSISTOR WITH ULTRAFAST SOFT RECOVERY DIODE



n-channel

V_{CES} = 600V

I_C = 8.0A, T_C=100°C

t_{sc} > 10µs, T_J=150°C

$V_{CE(on)}$ typ. = 1.8V

Features

- Low VCE (on) Non Punch Through IGBT Technology.
- 10µs Short Circuit Capability.
- Square RBSOA.
- Positive VCE (on) Temperature Coefficient.
- Maximum Junction Temperature rated at 175°C.
- Lead-Free

Benefits

- Benchmark Efficiency for Motor Control.
- Rugged Transient Performance.
- Low EMI.
- Excellent Current Sharing in Parallel Operation.


TO-220AB
FullPak

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	600	V
I_C @ T_C = 25°C	Continuous Collector Current	12	A
I_C @ T_C = 100°C	Continuous Collector Current	8.0	
I_{CM}	Pulse Collector Current (Ref.Fig.C.T.5)	24	
I_{LM}	Clamped Inductive Load current ①	24	
I_F @ T_C = 25°C	Diode Continuous Forward Current	9.0	
I_F @ T_C = 100°C	Diode Continuous Forward Current	6.0	
I_{FM}	Diode Maximum Forward Current	18	
V_{ISOL}	RMS Isolation Voltage, Terminal to Case, t=1 min.	2500	V
V_{GE}	Gate-to-Emitter Voltage	±20	
P_D @ T_C = 25°C	Maximum Power Dissipation	39	W
P_D @ T_C = 100°C	Maximum Power Dissipation	20	
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 / Mechanical Characteristics

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case- IGBT	—	—	3.8	°C/W
$R_{\theta JC}$	Junction-to-Case- Diode	—	—	6.0	
$R_{\theta CS}$	Case-to-Sink, flat, greased surface	—	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient, typical socket mount	—	—	62	
Wt	Weight	—	2.0	—	g

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

	Parameter	Min.	Typ.	Max.	Units	Conditions	Ref.Fig.
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	600	—	—	V	V_{GE} = 0V, I_C = 500µA	
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	0.57	—	V/°C	V_{GE} = 0V, I_C = 1mA (25°C-150°C)	
$V_{CE(on)}$	Collector-to-Emitter Voltage	—	1.8	2.2	V	I_C = 8.0A, V_{GE} = 15V, T_J = 25°C	5,6,7
		—	2.2	2.5		I_C = 8.0A, V_{GE} = 15V, T_J = 150°C	9,10,11
		—	2.3	2.5		I_C = 8.0A, V_{GE} = 15V, T_J = 175°C	
$V_{GE(th)}$	Gate Threshold Voltage	3.5	4.5	5.5	V	V_{CE} = V_{GE}, I_C = 250µA	9,10,11
$\Delta V_{GE(th)}/\Delta T_J$	Threshold Voltage temp. coefficient	—	-9.5	—	mV/°C	V_{CE} = V_{GE}, I_C = 1mA (25°C-150°C)	12
gfe	Forward Transconductance	—	3.7	—	S	V_{CE} = 50V, I_C = 8.0A, PW = 80µs	
I_{CES}	Zero Gate Voltage Collector Current	—	1.0	150	µA	V_{GE} = 0V, V_{CE} = 600V	
		—	200	500		V_{GE} = 0V, V_{CE} = 600V, T_J = 150°C	
		—	720	1100		V_{GE} = 0V, V_{CE} = 600V, T_J = 175°C	
V_{FM}	Diode Forward Voltage Drop	—	1.25	1.45	V	I_F = 5.0A, V_{GE} = 0V	8
		—	1.20	1.40		I_F = 5.0A, T_J = 150°C, V_{GE} = 0V	
		—	1.20	1.30		I_F = 5.0A, T_J = 175°C, V_{GE} = 0V	
I_{GES}	Gate-to-Emitter Leakage Current	—	—	±100	nA	V_{GE} = ±20V, V_{CE} = 0V	

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

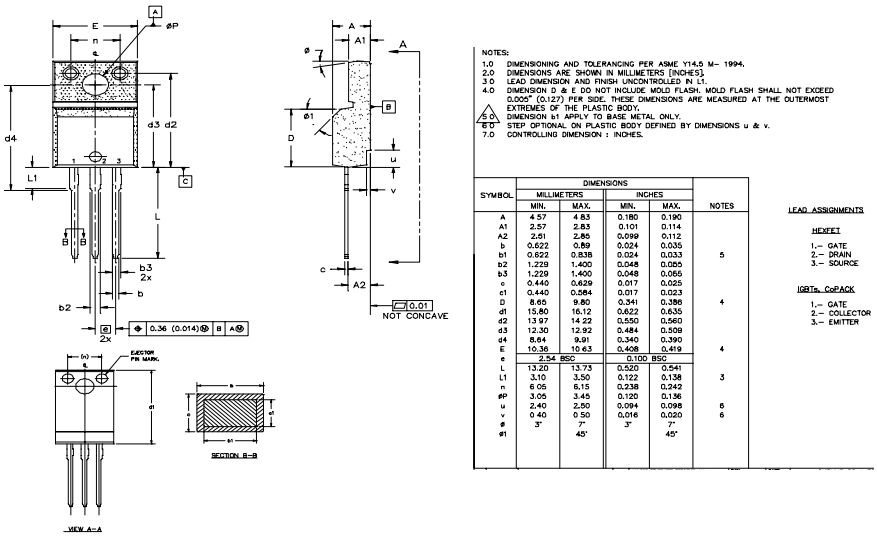
	Parameter	Min.	Typ.	Max.	Units	Conditions	Ref.Fig.
Q_g	Total Gate Charge (turn-on)	—	29	44	nC	I_C = 8.0A	23
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	3.7	5.6		V_{CC} = 400V	CT1
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	14	21		V_{GE} = 15V	
E_{on}	Turn-On Switching Loss	—	160	268	µJ	I_C = 8.0A, V_{CC} = 400V	CT4
E_{off}	Turn-Off Switching Loss	—	160	268		V_{GE} = 15V, R_G = 50Ω, L = 1.1mH	
E_{tot}	Total Switching Loss	—	320	433		T_J = 25°C ②	
$t_{d(on)}$	Turn-On delay time	—	23	27	ns	I_C = 8.0A, V_{CC} = 400V	
t_r	Rise time	—	22	26		V_{GE} = 15V, R_G = 50Ω, L = 1.1mH	CT4
$t_{d(off)}$	Turn-Off delay time	—	140	150		T_J = 25°C	
t_f	Fall time	—	32	42			
E_{on}	Turn-On Switching Loss	—	220	330	µJ	I_C = 8.0A, V_{CC} = 400V	CT4
E_{off}	Turn-Off Switching Loss	—	270	381		V_{GE} = 15V, R_G = 50Ω, L = 1.1mH	13,15
E_{tot}	Total Switching Loss	—	490	711		T_J = 150°C ②	WF1,WF2
$t_{d(on)}$	Turn-On delay time	—	22	27	ns	I_C = 8.0A, V_{CC} = 400V	14,16
t_r	Rise time	—	21	25		V_{GE} = 15V, R_G = 50Ω, L = 1.1mH	CT4
$t_{d(off)}$	Turn-Off delay time	—	180	198		T_J = 150°C	WF1
t_f	Fall time	—	40	56			WF2
L_E	Internal Emitter Inductance	—	7.5	—	nH	Measured 5mm from package	
C_{ies}	Input Capacitance	—	440	660	pF	V_{GE} = 0V	
C_{oes}	Output Capacitance	—	38	57		V_{CC} = 30V	22
C_{res}	Reverse Transfer Capacitance	—	16	24		f = 1.0MHz	
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T_J = 150°C, I_C = 54A, Vp = 600V	4
						V_{CC}=500V,V_{GE} = +15V to 0V,R_G = 50Ω	CT2
SCSOA	Short Circuit Safe Operating Area	10	—	—	µs	T_J = 150°C, Vp = 600V, R_G = 100Ω	CT3
						V_{CC}=360V,V_{GE} = +15V to 0V	WF4
I_{SC} (Peak)	Peak Short Circuit Collector Current	—	70	—	A		WF4
E_{rec}	Reverse Recovery Energy of the Diode	—	100	133	µJ	T_J = 150°C	17,18,19
t_{rr}	Diode Reverse Recovery Time	—	95	120	ns	V_{CC} = 400V, I_F = 8.0A, L = 1.07mH	20,21
I_{rr}	Peak Reverse Recovery Current	—	13	17	A	V_{GE} = 15V, R_G = 50Ω	CT4,WF3
Q_{rr}	Diode Reverse Recovery Charge	—	620	800	nC	di/dt = 500A/µS	

Note ① to ② are on page 12

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TO-220 Full-Pak Package Outline

Dimensions are shown in millimeters (inches)

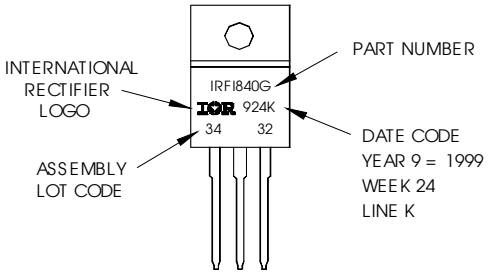


SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.57	4.83	0.180	0.190	
A1	2.57	2.83	0.101	0.114	
A2	2.61	2.85	0.099	0.112	
b	0.622	0.89	0.024	0.035	
b1	0.622	0.838	0.024	0.033	5
b2	1.229	1.400	0.048	0.055	
b3	1.229	1.400	0.048	0.055	
c	0.440	0.629	0.017	0.025	
c1	0.440	0.584	0.017	0.023	
D	8.65	9.80	0.341	0.386	4
d1	15.80	16.12	0.622	0.635	
d2	13.97	14.22	0.550	0.560	
d3	12.30	12.92	0.484	0.509	
d4	8.64	9.91	0.340	0.390	
E	10.38	10.63	0.408	0.419	4
e	2.54 BSC		0.100 BSC		
L	13.20	13.73	0.520	0.541	
L1	3.10	3.50	0.122	0.138	3
n	6.05	6.15	0.238	0.242	
øP	3.05	3.45	0.120	0.136	
u	2.40	2.50	0.094	0.098	6
v	0.40	0.50	0.016	0.020	6
ø	3°	7°	3°	7°	
ø1		45°		45°	

TO-220 Full-Pak Part Marking Information

EXAMPLE: THIS IS AN IRFI840G
WITH ASSEMBLY
LOT CODE 3432
ASSEMBLED ON WW 24 1999
IN THE ASSEMBLY LINE "K"

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



Notes:

① V_{CC} = 80% (V_{CES}), V_{GE} = 15V, L = 100µH, R_G = 50Ω.
② Energy losses include "tail" and diode reverse recovery.

TO-220AB FullPak package is not recommended for Surface Mount Application.

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.

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