

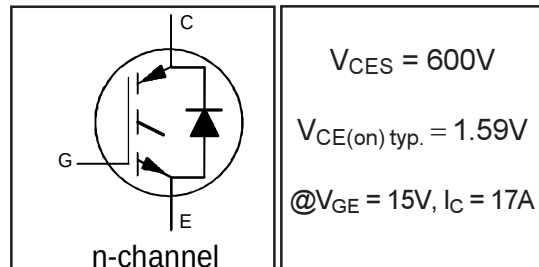
IRG4BC30FDPbF

INSULATED GATE BIPOLAR TRANSISTOR WITH ULTRAFAST
SOFT RECOVERY DIODE

Fast CoPack IGBT

Features

- Fast: Optimized for medium operating frequencies (1-5 kHz in hard switching, >20kHz in resonant mode).
- Generation 4 IGBT design provides tighter parameter distribution and higher efficiency than Generation 3
- IGBT co-packaged with HEXFRED™ ultrafast, ultra-soft-recovery anti-parallel diodes for use in bridge configurations
- Industry standard TO-220AB package
- Lead-Free



Benefits

- Generation -4 IGBT's offer highest efficiencies available
- IGBT's optimized for specific application conditions
- HEXFRED diodes optimized for performance with IGBT's. Minimized recovery characteristics require less/no snubbing
- Designed to be a "drop-in" replacement for equivalent industry-standard Generation 3 IR IGBT's



Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	600	V
$I_C @ T_C = 25^\circ C$	Continuous Collector Current	31	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	17	
I_{CM}	Pulsed Collector Current ①	124	
I_{LM}	Clamped Inductive Load Current ②	124	
$I_F @ T_C = 100^\circ C$	Diode Continuous Forward Current	12	
I_{FM}	Diode Maximum Forward Current	120	
V_{GE}	Gate-to-Emitter Voltage	± 20	V
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	100	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	42	
T_J	Operating Junction and	-55 to +150	$^\circ C$
T_{STG}	Storage Temperature Range		
	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 Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case - IGBT	-----	-----	1.2	$^\circ C/W$
$R_{\theta JC}$	Junction-to-Case - Diode	-----	-----	2.5	
$R_{\theta CS}$	Case-to-Sink, flat, greased surface	-----	0.50	-----	
$R_{\theta JA}$	Junction-to-Ambient, typical socket mount	-----	-----	80	
Wt	Weight	-----	2 (0.07)	-----	g (oz)

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 ^③	600	----	----	V	$V_{GE} = 0V, I_C = 250\mu A$
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	----	0.69	----	V/ $^\circ\text{C}$	$V_{GE} = 0V, I_C = 1.0mA$
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	----	1.59	1.8	V	$I_C = 17A, V_{GE} = 15V$
		----	1.99	----		$I_C = 31A$
		----	1.70	----		$I_C = 17A, T_J = 150^\circ\text{C}$
$V_{GE(th)}$	Gate Threshold Voltage	3.0	----	6.0		$V_{CE} = V_{GE}, I_C = 250\mu A$
$\Delta V_{GE(th)}/\Delta T_J$	Temperature Coeff. of Threshold Voltage	----	-11	----	mV/ $^\circ\text{C}$	$V_{CE} = V_{GE}, I_C = 250\mu A$
g_{fe}	Forward Transconductance ^④	6.1	10	----	S	$V_{CE} = 100V, I_C = 17A$
I_{CES}	Zero Gate Voltage Collector Current	----	----	250	μA	$V_{GE} = 0V, V_{CE} = 600V$
		----	----	2500		$V_{GE} = 0V, V_{CE} = 600V, T_J = 150^\circ\text{C}$
V_{FM}	Diode Forward Voltage Drop	----	1.4	1.7	V	$I_C = 12A$ See Fig. 13
		----	1.3	1.6		$I_C = 12A, T_J = 150^\circ\text{C}$
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)	----	51	77	nC	$I_C = 17A$
Q_{ge}	Gate - Emitter Charge (turn-on)	----	7.9	12		$V_{CC} = 400V$ See Fig. 8
Q_{gc}	Gate - Collector Charge (turn-on)	----	19	28		$V_{GE} = 15V$
$t_{d(on)}$	Turn-On Delay Time	----	42	----	ns	$T_J = 25^\circ\text{C}$
t_r	Rise Time	----	26	----		$I_C = 17A, V_{CC} = 480V$
$t_{d(off)}$	Turn-Off Delay Time	----	230	350		$V_{GE} = 15V, R_G = 23\Omega$
t_f	Fall Time	----	160	230		Energy losses include "tail" and diode reverse recovery.
E_{on}	Turn-On Switching Loss	----	0.63	----	mJ	See Fig. 9, 10, 11, 18
E_{off}	Turn-Off Switching Loss	----	1.39	----		
E_{ts}	Total Switching Loss	----	2.02	3.9		
$t_{d(on)}$	Turn-On Delay Time	----	42	----	ns	$T_J = 150^\circ\text{C}$, See Fig. 9, 10, 11, 18
t_r	Rise Time	----	27	----		$I_C = 17A, V_{CC} = 480V$
$t_{d(off)}$	Turn-Off Delay Time	----	310	----		$V_{GE} = 15V, R_G = 23\Omega$
t_f	Fall Time	----	310	----		Energy losses include "tail" and diode reverse recovery.
E_{ts}	Total Switching Loss	----	3.2	----	mJ	
L_E	Internal Emitter Inductance	----	7.5	----	nH	Measured 5mm from package
C_{ies}	Input Capacitance	----	1100	----	pF	$V_{GE} = 0V$
C_{oes}	Output Capacitance	----	74	----		$V_{CC} = 30V$ See Fig. 7
C_{res}	Reverse Transfer Capacitance	----	14	----		$f = 1.0MHz$
t_{rr}	Diode Reverse Recovery Time	----	42	60	ns	$T_J = 25^\circ\text{C}$ See Fig. 14
		----	80	120		$T_J = 125^\circ\text{C}$
I_{rr}	Diode Peak Reverse Recovery Current	----	3.5	6.0	A	$T_J = 25^\circ\text{C}$ See Fig. 15
		----	5.6	10		$T_J = 125^\circ\text{C}$
Q_{rr}	Diode Reverse Recovery Charge	----	80	180	nC	$T_J = 25^\circ\text{C}$ See Fig. 16
		----	220	600		$T_J = 125^\circ\text{C}$
$di_{(rec)M}/dt$	Diode Peak Rate of Fall of Recovery During t_b	----	180	----	A/ μs	$T_J = 25^\circ\text{C}$ See Fig. 17
		----	120	----		$T_J = 125^\circ\text{C}$