International
IOR Rectifier

Preliminary Data Sheet PD - 9.1115

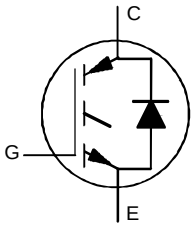
IRGPH30MD2

INSULATED GATE BIPOLAR TRANSISTOR WITH ULTRAFAST SOFT RECOVERY DIODE

Short Circuit Rated Fast CoPack IGBT

Features

- Short circuit rated -10µs @125°C, V_{GE} = 15V
- Switching-loss rating includes all "tail" losses
- HEXFRED™ soft ultrafast diodes
- Optimized for medium operating frequency (1 to 10kHz)



n-channel

V_{CES} = 1200V

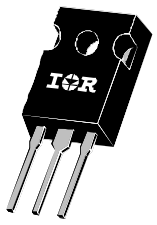
$V_{CE(sat)} \leq 3.5V$

@V_{GE} = 15V, I_C = 9.0A

Description

Co-packaged IGBTs are a natural extension of International Rectifier's well known IGBT line. They provide the convenience of an IGBT and an ultrafast recovery diode in one package, resulting in substantial benefits to a host of high-voltage, high-current, applications.

These new short circuit rated devices are especially suited for motor control and other applications requiring short circuit withstand capability.



TO-247AC

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	1200	V
I_C @ T_C = 25°C	Continuous Collector Current	15	A
I_C @ T_C = 100°C	Continuous Collector Current	9.0	
I_{CM}	Pulsed Collector Current ①	30	
I_{LM}	Clamped Inductive Load Current ②	30	
I_F @ T_C = 100°C	Diode Continuous Forward Current	6.0	
I_{FM}	Diode Maximum Forward Current	30	
t_{sc}	Short Circuit Withstand Time	10	µs
V_{GE}	Gate-to-Emitter Voltage	± 20	V
P_D @ T_C = 25°C	Maximum Power Dissipation	100	W
P_D @ T_C = 100°C	Maximum Power Dissipation	42	
T_J	Operating Junction and	-55 to +150	°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	°C/W
$R_{\theta JC}$	Junction-to-Case - Diode	—	—	2.5	
$R_{\theta CS}$	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)

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage ③	1200	—	—	V	V_{GE} = 0V, I_C = 250µA
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	—	—	V/°C	V_{GE} = 0V, I_C = 1.0mA
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	3.1	3.5	V	I_C = 9.0A V_{GE} = 15V
		—	4.9	—		I_C = 15A
		—	3.6	—		I_C = 9.0A, T_J = 150°C
$V_{GE(th)}$	Gate Threshold Voltage	3.0	—	5.5		V_{CE} = V_{GE}, I_C = 250µA
$\Delta V_{GE(th)}/\Delta T_J$	Temperature Coeff. of Threshold Voltage	—	-14	—	mV/°C	V_{CE} = V_{GE}, I_C = 250µA
g_{fe}	Forward Transconductance ④	2.5	—	—	S	V_{CE} = 100V, I_C = 9.0A
I_{CES}	Zero Gate Voltage Collector Current	—	—	250	µA	V_{GE} = 0V, V_{CE} = 1200V
		—	—	2500		V_{GE} = 0V, V_{CE} = 1200V, T_J = 150°C
V_{FM}	Diode Forward Voltage Drop	—	2.7	3.0	V	I_C = 6.0A
		—	2.4	2.7		I_C = 6.0A, T_J = 150°C
I_{GES}	Gate-to-Emitter Leakage Current	—	—	±100	nA	V_{GE} = ±20V

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
Q_g	Total Gate Charge (turn-on)	—	25	30	nC	I_C = 9.0A
Q_{ge}	Gate - Emitter Charge (turn-on)	—	—	6.0		V_{CC} = 960V
Q_{gc}	Gate - Collector Charge (turn-on)	—	—	15		
$t_{d(on)}$	Turn-On Delay Time	—	2.3	—	ns	T_J = 25°C
t_r	Rise Time	—	10	—		I_C = 9.0A, V_{CC} = 960V
$t_{d(off)}$	Turn-Off Delay Time	—	200	450		V_{GE} = 15V, R_G = 23Ω
t_f	Fall Time	—	210	390		Energy losses include "tail" and
E_{on}	Turn-On Switching Loss	—	—	—	mJ	diode reverse recovery.
E_{off}	Turn-Off Switching Loss	—	—	—		
E_{ts}	Total Switching Loss	—	4.0	7.0		
t_{sc}	Short Circuit Withstand Time	10	—	—	µs	V_{CC} = 720V, T_J = 125°C
						V_{GE} = 15V, R_G = 23Ω, V_{CPK} < 1000V
$t_{d(on)}$	Turn-On Delay Time	—	33	—	ns	T_J = 150°C,
t_r	Rise Time	—	20	—		I_C = 9.0A, V_{CC} = 960V
$t_{d(off)}$	Turn-Off Delay Time	—	480	—		V_{GE} = 15V, R_G = 23Ω
t_f	Fall Time	—	450	—		Energy losses include "tail" and
E_{ts}	Total Switching Loss	—	8.0	—	mJ	diode reverse recovery.
L_E	Internal Emitter Inductance	—	13	—	nH	Measured 5mm from package
C_{ies}	Input Capacitance	—	670	—	pF	V_{GE} = 0V
C_{oes}	Output Capacitance	—	50	—		V_{CC} = 30V
C_{res}	Reverse Transfer Capacitance	—	10	—		f = 1.0MHz
t_{rr}	Diode Reverse Recovery Time	—	53	80	ns	T_J = 25°C
		—	87	130		T_J = 125°C I_F = 6.0A
I_{rr}	Diode Peak Reverse Recovery Current	—	4.4	8.0	A	T_J = 25°C
		—	5.0	9.0		T_J = 125°C V_R = 200V
Q_{rr}	Diode Reverse Recovery Charge	—	116	320	nC	T_J = 25°C
		—	233	585		T_J = 125°C di/dt = 200A/µs
$di_{(rec)M}/dt$	Diode Peak Rate of Fall of Recovery	—	180	—	A/µs	T_J = 25°C
	During t_b	—	100	—		T_J = 125°C

Notes: ① Repetitive rating; V_{GE}=20V, pulse width limited by max. junction temperature.

② V_{CC}=80%(V_{CES}), V_{GE}=20V, L=10µH, R_G= 23Ω

③ Pulse width ≤ 80µs; duty factor ≤ 0.1%.

④ Pulse width 5.0µs, single shot.

Refer to Section D - page D-13 for Package Outline 3 - JEDEC Outline TO-247AC