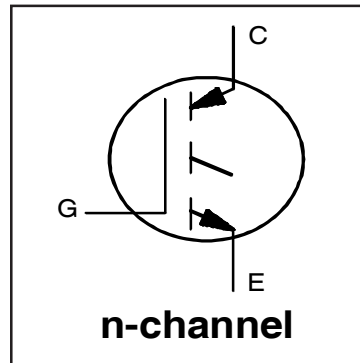


INSULATED GATE BIPOLAR TRANSISTOR

IRGP4063PbF
IRGP4063-EPbF

Features

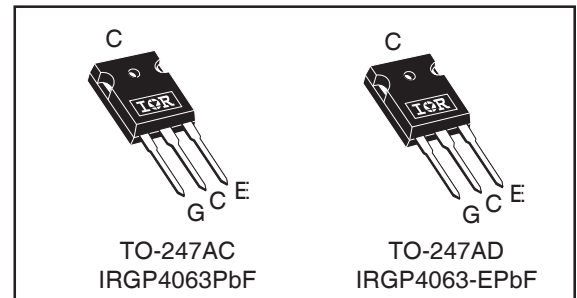
- Low $V_{CE(ON)}$ Trench IGBT Technology
- Low switching losses
- Maximum Junction temperature 175 °C
- 5 μ S short circuit SOA
- Square RBSOA
- 100% of the parts tested for I_{LM} ①
- Positive $V_{CE(ON)}$ Temperature co-efficient
- Tight parameter distribution
- Lead Free Package



$V_{CES} = 600V$
$I_C = 48A, T_C = 100^\circ C$
$t_{SC} \geq 5\mu s, T_{J(max)} = 175^\circ C$
$V_{CE(on)} \text{ typ.} = 1.65V$

Benefits

- High Efficiency in a wide range of applications
- Suitable for a wide range of switching frequencies due to Low $V_{CE(ON)}$ and Low Switching losses
- Rugged transient Performance for increased reliability
- Excellent Current sharing in parallel operation
- Low EMI



G	C	E
Gate	Collector	Emitter

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	600	V
$I_C @ T_C = 25^\circ C$	Continuous Collector Current	96 ②	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	48	
I_{CM}	Pulse Collector Current, $V_{GE} = 15V$	144	A
I_{LM}	Clamped Inductive Load Current, $V_{GE} = 20V$ ①	192	A
V_{GE}	Continuous Gate-to-Emitter Voltage	± 20	V
	Transient Gate-to-Emitter Voltage	± 30	
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	330	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	170	
T_J	Operating Junction and	-55 to +175	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 sec.		
	Mounting Torque, 6-32 or M3 Screw	10 lbf-in (1.1 N-m)	

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$ (IGBT)	Thermal Resistance Junction-to-Case-(each IGBT)	—	—	0.45	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink (flat, greased surface)	—	0.24	—	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (typical socket mount)	—	—	40	

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 = 150μA ④	CT6
ΔV _{(BR)CES} /ΔT _J	Temperature Coeff. of Breakdown Voltage	—	0.30	—	V/°C	V _{GE} = 0V, I _C = 1mA (25°C-175°C)	CT6
V _{CE(on)}	Collector-to-Emitter Saturation Voltage	—	1.65	2.14	V	I _C = 48A, V _{GE} = 15V, T _J = 25°C	5,6,7
		—	2.0	—		I _C = 48A, V _{GE} = 15V, T _J = 150°C	8,9,10
		—	2.05	—		I _C = 48A, V _{GE} = 15V, T _J = 175°C	
V _{GE(th)}	Gate Threshold Voltage	4.0	—	6.5	V	V _{CE} = V _{GE} , I _C = 1.4mA	8,9
ΔV _{GE(th)} /ΔT _J	Threshold Voltage temp. coefficient	—	-21	—	mV/°C	V _{CE} = V _{GE} , I _C = 1.0mA (25°C - 175°C)	10,11
g _{fe}	Forward Transconductance	—	32	—	S	V _{CE} = 50V, I _C = 48A, PW = 80μs	
I _{CES}	Collector-to-Emitter Leakage Current	—	1.0	150	μA	V _{GE} = 0V, V _{CE} = 600V	
		—	450	1000		V _{GE} = 0V, V _{CE} = 600V, T _J = 175°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	Ref.Fig
Q _g	Total Gate Charge (turn-on)	—	95	140	nC	I _C = 48A	18
Q _{ge}	Gate-to-Emitter Charge (turn-on)	—	28	42		V _{GE} = 15V	CT1
Q _{gc}	Gate-to-Collector Charge (turn-on)	—	35	53		V _{CC} = 400V	
E _{on}	Turn-On Switching Loss ⑤	—	625	1141	μJ	I _C = 48A, V _{CC} = 400V, V _{GE} = 15V	CT4
E _{off}	Turn-Off Switching Loss	—	1275	1481		R _G = 10Ω, L = 200μH, L _S = 150nH, T _J = 25°C	
E _{total}	Total Switching Loss	—	1900	2622		Energy losses include tail & diode reverse recovery	
t _{d(on)}	Turn-On delay time	—	60	78		I _C = 48A, V _{CC} = 400V, V _{GE} = 15V	CT4
t _r	Rise time	—	40	56	ns	R _G = 10Ω, L = 200μH, L _S = 150nH, T _J = 25°C	
t _{d(off)}	Turn-Off delay time	—	145	176			
t _f	Fall time	—	35	46			
E _{on}	Turn-On Switching Loss ⑤	—	1625	—		μJ	I _C = 48A, V _{CC} = 400V, V _{GE} = 15V
E _{off}	Turn-Off Switching Loss	—	1585	—	R _G = 10Ω, L = 200μH, L _S = 150nH, T _J = 175°C ④		CT4
E _{total}	Total Switching Loss	—	3210	—	Energy losses include tail & diode reverse recovery		WF1, WF2
t _{d(on)}	Turn-On delay time	—	55	—	I _C = 48A, V _{CC} = 400V, V _{GE} = 15V		13, 15
t _r	Rise time	—	45	—	ns	R _G = 10Ω, L = 200μH, L _S = 150nH	CT4
t _{d(off)}	Turn-Off delay time	—	165	—		T _J = 175°C	WF1
t _f	Fall time	—	45	—			WF2
C _{ies}	Input Capacitance	—	3025	—		pF	V _{GE} = 0V
C _{oes}	Output Capacitance	—	245	—	V _{CC} = 30V		
C _{res}	Reverse Transfer Capacitance	—	90	—	f = 1.0Mhz		
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T _J = 175°C, I _C = 192A V _{CC} = 480V, V _p = 600V R _G = 10Ω, V _{GE} = +15V to 0V	4 CT2
SCSOA	Short Circuit Safe Operating Area	5	—	—	μs	V _{CC} = 400V, V _p = 600V R _G = 10Ω, V _{GE} = +15V to 0V	16, CT3 WF3

Notes:

- ① V_{CC} = 80% (V_{CES}), V_{GE} = 20V, L = 200μH, R_G = 10Ω.
- ② This is only applied to TO-247AC package.
- ③ Pulse width limited by max. junction temperature.
- ④ Refer to AN-1086 for guidelines for measuring V_{(BR)CES} safely.
- ⑤ Turn-on energy is measured using the same co-pak diode as IRGP4063DPbF.
- ⑥ Calculated continuous current based on maximum allowable junction temperature.
Bond wire current limit is 80A. Note that current limitations arising from heating of the device leads may occur with some lead mounting arrangements.