

**Insulated Gate Bipolar Transistor with Ultrafast Soft Recovery Diode**

$V_{CES} = 600V$   
 $I_C = 20A, T_C = 100^\circ C$   
 $t_{SC} \geq 5\mu s, T_{J(max)} = 175^\circ C$   
 $V_{CE(ON)}$  typ. = 1.55V @  $I_C = 12A$

**Applications**

- Industrial Motor Drive
- Inverters
- UPS
- Welding

G	C	E
Gate	Collector	Emitter

Features	Benefits
Low $V_{CE(ON)}$ and switching losses	High efficiency in a wide range of applications and switching frequencies
Square RBSOA and maximum junction temperature 175°C	Improved reliability due to rugged hard switching performance and high power capability
Positive $V_{CE(ON)}$ temperature coefficient	Excellent current sharing in parallel operation
5µs Short Circuit SOA	Enables short circuit protection scheme
Lead-Free, RoHS Compliant	Environmentally friendly

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRGB4620DPbF	TO-220AB	Tube	50	IRGB4620DPbF
IRGIB4620DPbF	TO-220AB Full-Pak	Tube	50	IRGIB4620DPbF
IRGP4620DPbF	TO-247AC	Tube	25	IRGP4620DPbF
IRGP4620D-EPbF	TO-247AD	Tube	25	IRGP4620D-EPbF
IRGS4620DPbF	D²Pak	Tube	50	IRGS4620DPbF
		Tape and Reel Right	800	IRGS4620DTRRPbF
		Tape and Reel Left	800	IRGS4620DTRLpbF

**Absolute Maximum Ratings**

	Parameter	Max.	Units
$V_{CES}$	Collector-to-Emitter Voltage	600	V
$I_C @ T_C = 25^\circ\text{C}$	Continuous Collector Current <sup>①</sup>	32	A
$I_C @ T_C = 100^\circ\text{C}$	Continuous Collector Current <sup>①</sup>	20	
$I_{CM}$	Pulse Collector Current, $V_{GE} = 15\text{V}$ <sup>④</sup>	36	
$I_{LM}$	Clamped Inductive Load Current, $V_{GE} = 20\text{V}$ <sup>⑦</sup>	48	
$I_F @ T_C = 25^\circ\text{C}$	Diode Continuous Forward Current <sup>①</sup>	16	
$I_F @ T_C = 100^\circ\text{C}$	Diode Continuous Forward Current <sup>①</sup>	10	
$I_{FM}$	Diode Maximum Forward Current <sup>④</sup>	48	
$V_{GE}$	Continuous Gate-to-Emitter Voltage	$\pm 20$	V
	Transient Gate to Emitter Voltage	$\pm 30$	
$P_D @ T_C = 25^\circ\text{C}$	Maximum Power Dissipation	140	W
$P_D @ T_C = 100^\circ\text{C}$	Maximum Power Dissipation	70	
$T_J$	Operating Junction and	-40 to +175	C
$T_{STG}$	Storage Temperature Range		
	Soldering Temperature, for 10 sec. (1.6mm from case)		
	Mounting Torque, 6-32 or M3 Screw (TO-220, TO-247)		

**Thermal Resistance**

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$ (IGBT) <sup>②</sup>	Thermal Resistance Junction-to-Case (D <sup>2</sup> Pak, TO-220)	—	—	1.07	°C/W
	Thermal Resistance Junction-to-Case (TO-220 Full-Pak)	—	—	3.75	
	Thermal Resistance Junction-to-Case (TO-247)	—	—	1.12	
$R_{\theta JC}$ (Diode) <sup>②</sup>	Thermal Resistance Junction-to-Case (D <sup>2</sup> Pak, TO-220)	—	—	3.66	
	Thermal Resistance Junction-to-Case (TO-220 Full-Pak)	—	—	6.22	
	Thermal Resistance Junction-to-Case (TO-247)	—	—	3.71	
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink (flat, greased surface-TO-220, D <sup>2</sup> Pak, TO-220 Full-Pak )	—	0.50	—	
	Thermal Resistance Case-to-Sink (TO-247)	—	0.24	—	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (PCB Mount - D <sup>2</sup> Pak) <sup>⑥</sup>	—	—	40	
	Thermal Resistance, Junction-to-Ambient (Socket Mount –TO-247)	—	—	40	
	Thermal Resistance, Junction-to-Ambient (Socket Mount –TO-220)	—	—	62	
	Thermal Resistance, Junction-to-Ambient (Socket Mount –TO-220 Full-Pak)	—	—	65	

**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	600	—	—	V	$V_{GE} = 0\text{V}$ , $I_C = 100\mu\text{A}$ <sup>③</sup>
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	0.40	—	V/°C	$V_{GE} = 0\text{V}$ , $I_C = 1\text{mA}$ (25°C-175°C)
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	1.55	1.85	V	$I_C = 12\text{A}$ , $V_{GE} = 15\text{V}$ , $T_J = 25^\circ\text{C}$
		—	1.90	—		$I_C = 12\text{A}$ , $V_{GE} = 15\text{V}$ , $T_J = 150^\circ\text{C}$
		—	1.97	—		$I_C = 12\text{A}$ , $V_{GE} = 15\text{V}$ , $T_J = 175^\circ\text{C}$
$V_{GE(th)}$	Gate Threshold Voltage	4.0	—	6.5	V	$V_{CE} = V_{GE}$ , $I_C = 350\mu\text{A}$
$\Delta V_{GE(th)}/\Delta T_J$	Threshold Voltage Temp. Coefficient	—	-18	—	mV/°C	$V_{CE} = V_{GE}$ , $I_C = 1.0\text{mA}$ (25°C-175°C)
$g_{fe}$	Forward Transconductance	—	7.7	—	S	$V_{CE} = 50\text{V}$ , $I_C = 12\text{A}$ , $PW = 80\mu\text{s}$
$I_{CES}$	Collector-to-Emitter Leakage Current	—	2.0	—	$\mu\text{A}$	$V_{GE} = 0\text{V}$ , $V_{CE} = 600\text{V}$
		—	475	—		$V_{GE} = 0\text{V}$ , $V_{CE} = 600\text{V}$ , $T_J = 175^\circ\text{C}$
$I_{GES}$	Gate-to-Emitter Leakage Current	—	—	$\pm 100$	nA	$V_{GE} = \pm 20\text{V}$
$V_{FM}$	Diode Forward Voltage Drop	—	2.1	3.1	V	$I_F = 12\text{A}$
		—	1.6	—		$I_F = 12\text{A}$ , $T_J = 175^\circ\text{C}$