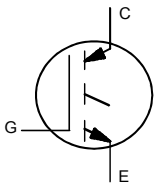
INSULATED GATE BIPOLAR TRANSISTOR



n-channel

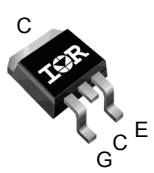
V_{CES} = 600V
I_C = 50A, T_C = 100C
At T_J = 175°C
$t_{SC} \geq$ 10µs, T_J = 150°C
$V_{CE(on)}$ typ. = 1.95V

Features

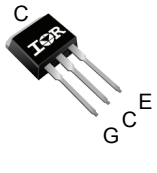
- Low $V_{CE\ (on)}$ Non Punch Through IGBT Technology
- 10µs Short Circuit Capability
- Square RBSOA
- Positive $V_{CE\ (on)}$ Temperature Coefficient.
- Maximum Junction Temperature rated at 175°C
- Lead-Free, RoHS Compliant
- Automotive Qualified * *

Benefits

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



AUIRGS30B60K
D^2Pak



AUIRGSL30B60K
TO-262Pak

G	C	E
Gate	Collector	Emitter

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
AUIRGSL30B60K	TO-262	Tube	50	AUIRGSL30B60K
AUIRGS30B60K	D^2 Pak	Tube	50	AUIRGS30B60K
		Tape and Reel Left	800	AUIRGS30B60KTRL
		Tape and Reel Right	800	AUIRGS30B60KTRR

Absolute Maximum Ratings

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only; and functional operation of the device at these or any other condition beyond those indicated in the specifications is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions. Ambient temperature (T_A) is 25°C, unless otherwise specified.

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	600	V
I_C @ T_C = 25°C	Continuous Collector Current	78	A
I_C @ T_C = 100°C	Continuous Collector Current	50	
I_{CM}	Pulse Collector Current (Ref.Fig.C.T.5)	120	
I_{LM}	Clamped Inductive Load Current ①	120	
V_{ISOL}	RMS Isolation Voltage, Terminal to Case, t=1 min.	2500	V
V_{GE}	Continuous Gate-to-Emitter Voltage	±20	
P_D @ T_C = 25°C	Maximum Power Dissipation	370	W
P_D @ T_C = 100°C	Maximum Power Dissipation	180	
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)	

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$ (IGBT)	Thermal Resistance Junction-to-Case (IGBT)	——	——	0.41*	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink (flat, greased surface)	——	0.50	——	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (typical socket mount)	——	——	40	
Wt	Weight	——	1.44	——	g

* $R_{\theta JC}$ (end of life) = 0.65°C/W. This is the maximum measured value after 1000 temperature cycles from -55 to 150°C and is accounted for by the physical wearout of the die attach medium.

** Qualification standards can be found at www.infineon.com

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	—	0.40	—	V/°C	V_{GE} = 0V, I_C = 1mA (25°C-150°C)	
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	1.95	2.35	V	I_C = 30A, V_{GE} = 15V, T_J = 25°C	5,6,7
		—	2.40	2.75		I_C = 30A, V_{GE} = 15V, T_J = 150°C	8,9,10
		—	2.6	2.95		I_C = 30A, V_{GE} = 15V, T_J = 175°C	
$V_{GE(th)}$	Gate Threshold Voltage	3.5	4.5	5.5	V	I_C = 250µA	8,9,10,
$\Delta V_{GE(th)}/\Delta TJ$	Threshold Voltage temp. coefficient	—	-10	—	mV/°C	V_{CE} = V_{GE}, I_C = 1.0mA (25°C-150°C)	11
gfe	Forward Transconductance	—	18	—	S	V_{CE} = 50V, I_C = 50A,PW = 80µs	
I_{CES}	Collector-to-Emitter Leakage Current	—	5.0	250	µA	V_{GE} = 0V, V_{CE} = 600V	
			1000	2000		V_{GE} = 0V, V_{CE} = 600V,T_J = 150°C	
		—	1830	3000		V_{GE} = 0V, V_{CE} = 600V,T_J = 175°C	
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)	—	102	153	nC	I_C = 30A	17
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	14	21		V_{GE} = 15V	CT1
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	44	66		V_{CC} = 400V	
E_{on}	Turn-On Switching Loss	—	350	620	µJ		
E_{off}	Turn-Off Switching Loss	—	825	955			
E_{total}	Total Switching Loss	—	1175	1575		I_C = 30A, V_{CC} = 400V,	
$t_{d(on)}$	Turn-On delay time	—	46	60	ns	V_{GE} = +15V,	CT4
t_r	Rise time	—	28	39		R_G = 10Ω, L = 200µH, T_J = 25°C ③	
$t_{d(off)}$	Turn-Off delay time	—	185	200			
t_f	Fall time	—	31	40			
E_{on}	Turn-On Switching Loss	—	635	1085	µJ		12,14,
E_{off}	Turn-Off Switching Loss	—	1150	1350			CT4
E_{total}	Total Switching Loss	—	1785	2435		I_C = 30A, V_{CC} = 400V,	WF1,WF2
$t_{d(on)}$	Turn-On delay time	—	46	60	ns	V_{GE} = +15V,	13,15
t_r	Rise time	—	28	39		R_G = 10Ω, L = 200µH, T_J = 150°C	CT4
$t_{d(off)}$	Turn-Off delay time	—	205	235			WF1
t_f	Fall time	—	32	42			WF2
L_E	Internal Emitter Inductance	—	7.5	—	nH	Measured 5mm from package	
C_{ies}	Input Capacitance	—	1750	—	pF	V_{GE} = 0V	
C_{oes}	Output Capacitance	—	160	—		V_{CC} = 30V	16
C_{res}	Reverse Transfer Capacitance	—	60	—		f = 1.0Mhz	
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T_J = 150°C, I_C = 120A,Vp = 600V V_{CC} = 500V, V_{GE} = +15V to 0V Rg = 10Ω	4 CT2
SCSOA	Short Circuit Safe Operating Area	10	—	—	µs	T_J = 150°C, Vp = 600V ,Rg = 10Ω V_{CC} = 360V, V_{GE} = +15V to 0V	CT3 WF3
I_{SC} (Peak)	Peak Short Circuit Collector Current	—	200	—	A		WF3

Notes:

① V_{CC} = 80% (V_{CES}), V_{GE} = 20V, L = 28µH, R_G = 22Ω.

② This is applied to D2Pak, when mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994.

③ Energy losses include "tail" and diode reverse recovery.