

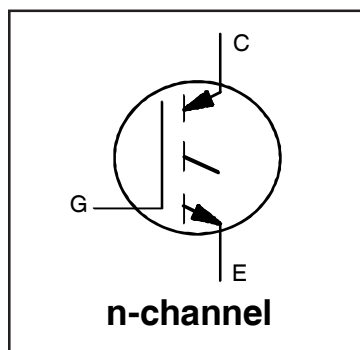
INSULATED GATE BIPOLAR TRANSISTOR

Features

- Standard: Optimized for minimum saturation voltage and low operating frequencies (< 1kHz)
- Generation 4 IGBT design provides tighter parameter distribution and higher efficiency
- Industry standard TO-247AC package
- Lead-Free
- Automotive Qualified *

Benefits

- Generation 4 IGBT's offer highest efficiency available
- IGBT's optimized for specified application conditions



$V_{CES} = 1200V$
 $I_C = 81A @ T_C = 100^{\circ}C$
 $V_{CE(on)} \text{ typ.} = 1.47V @ 33A$



TO-247AC

G	C	E
Gate	Collector	Emitter

Base part number	Package Type	Standard Pack		Complete Part Number
		Form	Quantity	
AUIRG4PH50S	TO-247AC	Tube	25	AUIRG4PH50S

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	1200	V
$I_C @ T_C = 25^{\circ}C$	Continuous Collector Current	141 ^⑤	A
$I_C @ T_C = 100^{\circ}C$	Continuous Collector Current	81	
I_{CM}	Pulse Collector Current, $V_{GE} = 15V$ ②	99	
I_{LM}	Clamped Inductive Load Current, $V_{GE} = 20V$ ①	99	
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	543	W
$P_D @ T_C = 100^{\circ}C$	Maximum Power Dissipation	217	
T_J	Operating Junction and	-55 to +150	°C
T_{STG}	Storage Temperature Range		
	Soldering Temperature, for 10 sec. (1.6mm from case)	300	
	Mounting Torque, 6-32 or M3 Screw	10 lbf-in (1.1N-m)	

Thermal Resistance

	Parameter	Min.	Typ.	Max.	Units
$R_{\theta JC}$ (IGBT)	Thermal Resistance Junction-to-Case (IGBT) ④	—	—	0.23	°C/W
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink (flat, greased surface)	—	0.24	—	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	—	40	—	

*Qualification standards can be found at <http://www.irf.com/>

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)CES}	Collector-to-Emitter Breakdown Voltage	1200	—	—	V	V _{GE} = 0V, I _C = 250μA ③
ΔV _{(BR)CES} /ΔT _J	Temperature Coeff. of Breakdown Voltage	—	1.2	—	V/°C	V _{GE} = 0V, I _C = 1mA (25°C-150°C) ③
V _{CE(on)}	Collector-to-Emitter Saturation Voltage	—	1.47	1.7	V	I _C = 33A, V _{GE} = 15V, T _J = 25°C
		—	1.55	—		I _C = 33A, V _{GE} = 15V, T _J = 150°C
V _{GE(th)}	Gate Threshold Voltage	3.0	—	6.0	V	V _{CE} = V _{GE} , I _C = 250μA
ΔV _{GE(th)} /ΔT _J	Threshold Voltage temp. coefficient	—	-11	—	mV/°C	V _{CE} = V _{GE} , I _C = 250μA (25°C - 150°C)
g _{fe}	Forward Transconductance	—	30	—	S	V _{CE} = 50V, I _C = 33A, PW = 20μs
I _{CES}	Collector-to-Emitter Leakage Current	—	—	250	μA	V _{GE} = 0V, V _{CE} = 1200V, T _J = 25°C
		—	—	1000		V _{GE} = 0V, V _{CE} = 1200V, 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)	—	151	227	nC	I _C = 33A V _{GE} = 15V V _{CC} = 600V
Q _{ge}	Gate-to-Emitter Charge (turn-on)	—	26	39		
Q _{gc}	Gate-to-Collector Charge (turn-on)	—	62	93		
E _{off}	Turn-Off Switching Loss	—	15	16	mJ	I _C = 33A, V _{CC} = 600V, V _{GE} = 15V R _G = 5Ω, L = 400μH, T _J = 25°C Energy losses include tail
t _{d(off)}	Turn-Off delay time	—	485	616	ns	I _C = 33A, V _{CC} = 600V, V _{GE} = 15V R _G = 5Ω, L = 400μH, T _J = 25°C
t _f	Fall time	—	1193	1371		
E _{off}	Turn-Off Switching Loss	—	29	—	mJ	I _C = 33A, V _{CC} = 600V, V _{GE} = 15V R _G = 5Ω, L = 400μH, T _J = 150°C Energy losses include tail
t _{d(off)}	Turn-Off delay time	—	689	—	ns	I _C = 33A, V _{CC} = 600V, V _{GE} = 15V R _G = 5Ω, L = 400μH, T _J = 150°C
t _f	Fall time	—	2462	—		
C _{ies}	Input Capacitance	—	3804	—	pF	V _{GE} = 0V V _{CC} = 30V f = 1.0Mhz
C _{oes}	Output Capacitance	—	161	—		
C _{res}	Reverse Transfer Capacitance	—	31	—		
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T _J = 150°C, I _C = 99A V _{CC} = 960V, V _p ≤ 1200V R _G = 5Ω, V _{GE} = +20V to 0V

Notes:

- ① V_{CC} = 80% (V_{CES}), V_{GE} = 20V, L = 400μH, R_G = 50Ω.
- ② Pulse width limited by max. junction temperature.
- ③ Refer to AN-1086 for guidelines for measuring V_{(BR)CES} safely.
- ④ R_θ is measured at T_J of approximately 90°C.
- ⑤ Calculated continuous current based on maximum allowable junction temperature. Bond wire current limit is 78A. Note that current limitations arising from heating of the device leads may occur with some lead mounting arrangements.