

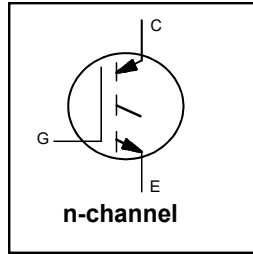
Insulated Gate Bipolar Transistor

Features

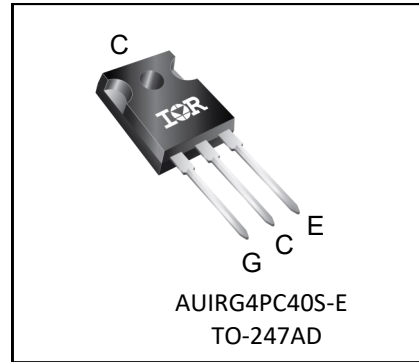
- Standard: Optimized for minimum saturation voltage and low operating frequencies (< 1kHz)
- Generation 4 IGBT design provides tighter parameter distribution and higher efficiency than Generation 3
- Industry standard TO-247AD package
- Lead-Free
- Automotive Qualified*

Benefits

- Generation 4 IGBT's offer highest efficiency available
- IGBT's optimized for specified application conditions
- Designed to be a "drop-in" replacement for equivalent industry-standard Generation 3 IR IGBT's



$V_{CES} = 600V$
 $V_{CE(ON)} \text{ typ.} = 1.32V$
 @ $V_{GE} = 15V, I_C = 31A$



G	C	E
Gate	Collector	Emitter

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
AUIRG4PC40S-E	TO-247AD	Tube	25	AUIRG4PC40S-E

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Voltage	600	V
$I_C @ T_C = 25^\circ C$	Continuous Collector Current	60	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	31	
I_{CM}	Pulse Collector Current ①	120	
I_{LM}	Clamped Inductive Load Current ②	120	
V_{GE}	Continuous Gate-to-Emitter Voltage	± 20	V
E_{ARV}	Reverse Voltage Avalanche Energy ③	15	
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	160	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	65	
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to +150	C
	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	Typ.	Max.	Units
$R_{\theta JC}$	Thermal Resistance Junction-to-Case	—	0.77	$^\circ C/W$
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink (flat, greased surface)	0.24	—	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (typical socket mount)	—	40	
Wt	Weight	6 (0.21)	—	g (oz)

* Qualification standard can be found at www.infineon.com/

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)CES}	Collector-to-Emitter Breakdown Voltage	600	—	—	V	V _{GE} = 0V, I _C = 250μA
V _{(BR)ECS}	Emitter-to-Collector Breakdown Voltage ④	18	—	—		V _{GE} = 0V, I _C = 1.0A
ΔV _{(BR)CES} /ΔT _J	Temperature Coeff. of Breakdown Voltage	—	0.75	—	V/°C	V _{GE} = 0V, I _C = 1mA
V _{CE(on)}	Collector-to-Emitter Saturation Voltage	—	1.32	1.5	V	I _C = 31A, V _{GE} = 15V, T _J = 25°C
		—	1.68	—		I _C = 60A, V _{GE} = 15V, See Fig. 2,5
		—	1.32	—		I _C = 31A, 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 Temperature Coeff.	—	-9.3	—	mV/°C	V _{CE} = V _{GE} , I _C = 250μA
g _{fe}	Forward Transconductance⑤	12	21	—	S	V _{CE} = 100V, I _C = 31A
I _{CES}	Collector-to-Emitter Leakage Current	—	—	250	μA	V _{GE} = 0V, V _{CE} = 600V
		—	—	2.0		V _{GE} = 0V, V _{CE} = 10V, T _J = 25°C
		—	—	1000		V _{GE} = 0V, V _{CE} = 600V, 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)	—	100	150	nC	I _C = 31A V _{GE} = 15V V _{CC} = 400V See Fig.8
Q _{ge}	Gate-to-Emitter Charge (turn-on)	—	14	21		
Q _{gc}	Gate-to-Collector Charge (turn-on)	—	34	51		
t _{d(on)}	Turn-On delay time	—	22	—	ns	I _C = 31A, V _{CC} = 480V, V _{GE} =15V R _G = 10Ω, T _J = 25°C Energy losses include "tail"
t _r	Rise time	—	18	—		
t _{d(off)}	Turn-Off delay time	—	650	980		
t _f	Fall time	—	380	570		
E _{on}	Turn-On Switching Loss	—	0.45	—	mJ	See Fig. 10, 11, 13, 14
E _{off}	Turn-Off Switching Loss	—	6.5	—		
E _{ts}	Total Switching Loss	—	6.95	9.9		
t _{d(on)}	Turn-On delay time	—	23	—	ns	I _C = 31A, V _{CC} = 480V, V _{GE} =15V R _G = 10Ω, T _J = 150°C Energy losses include "tail"
t _r	Rise time	—	21	—		
t _{d(off)}	Turn-Off delay time	—	1000	—		
t _f	Fall time	—	940	—		
E _{ts}	Total Switching Loss	—	12	—	mJ	See Fig. 13, 14
L _E	Internal Emitter Inductance	—	13	—	nH	Measured 5mm from package
C _{ies}	Input Capacitance	—	2200	—	pF	V _{GE} = 0V V _{CC} = 30V f = 1.0Mhz See Fig. 7
C _{oes}	Output Capacitance	—	140	—		
C _{res}	Reverse Transfer Capacitance	—	26	—		

Notes:

- ① Repetitive rating; V_{GE} = 20V, pulse width limited by max. junction temperature. (See fig. 13b)
- ② V_{CC} = 80%(V_{CES}), V_{GE} = 20V, L = 10μH, R_G = 10Ω, (See fig. 13a)
- ③ Repetitive rating; pulse width limited by maximum junction temperature.
- ④ Pulse width ≤ 80μs; duty factor ≤ 0.1%.
- ⑤ Pulse width 5.0μs, single shot.