

CooliRIGBT™

Features

- Designed And Qualified for Automotive Applications
- Ultra Fast Switching IGBT:70-200kHz
- Extremely Low Switching Losses
- Maximum Junction Temperature 175 °C
- Square RBSOA
- Positive $V_{CE(on)}$ Temperature Coefficient

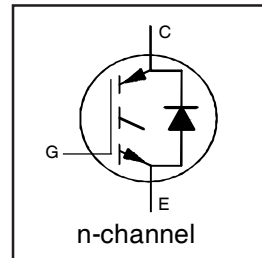
Benefits

- Optimized High Frequency Switching Applications
- Rugged Transient Performance for Increased Reliability
- Excellent Current Sharing in Parallel Operation

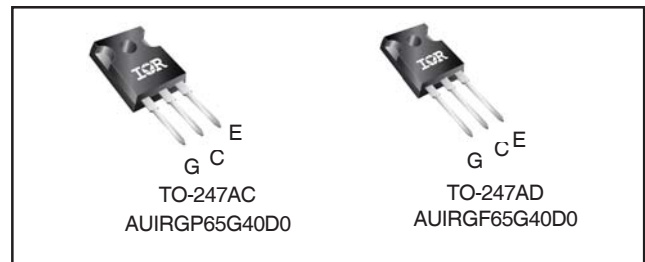
Applications

- DC-DC Converter
- PFC

ULTRAFAST IGBT WITH ULTRAFAST SOFT RECOVERY DIODE



$V_{CES} = 600V$
$V_{CE(on)} \text{ typ.} = 1.8V$
$I_C @ T_C = 100^\circ C = 41A$
$T_J \text{ max} = 175^\circ C$



G	C	E
Gate	Collector	Emitter

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
AUIRGP65G40D0	TO-247AC	Tube	25	AUIRGP65G40D0
AUIRGF65G40D0	TO-247AD	Tube	25	AUIRGF65G40D0

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
$I_C @ T_C = 25^\circ C$	Continuous Collector Current ⑥	62	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current ⑥	41	
$I_{NOMINAL}$	Nominal Current @ 200kHz ⑦	20	
I_{CM}	Pulse Collector Current	84	
I_{LM}	Clamped Inductive Load Current ①	112	
$I_F @ T_C = 25^\circ C$	Diode Continuous Forward Current	46.1	
$I_F @ T_C = 100^\circ C$	Diode Continuous Forward Current	30	
I_{FRM}	Maximum Repetitive Forward Current ②	112	V
V_{GE}	Gate-to-Emitter Voltage	±20	
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	625	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	313	
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)	
	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)	Junction-to-Case-(each IGBT) ④	—	—	0.24	°C/W
$R_{\theta JC}$ (Diode)	Junction-to-Case-(each Diode) ④	—	—	1.78	
$R_{\theta CS}$	Case-to-Sink (flat, greased surface)	—	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient (typical socket mount)	—	—	40	
		—	6.0 (0.21)	—	g (oz)

*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	600	—	—	V	V _{GE} = 0V, I _C = 500μA ③
ΔV _{(BR)CES} /ΔT _J	Temperature Coeff. of Breakdown Voltage	—	0.18	—	V/°C	V _{GE} = 0V, I _C = 1.0mA (25°C-175°C)
V _{CE(on)}	Collector-to-Emitter Saturation Voltage	—	1.4	—	V	I _C = 12A, V _{GE} = 15V, T _J = 25°C
		—	1.8	2.2		I _C = 20A, V _{GE} = 15V, T _J = 25°C
		—	1.9	—		I _C = 12A, V _{GE} = 15V, T _J = 150°C
		—	2.6	—		I _C = 20A, V _{GE} = 15V, T _J = 150°C
		—	2.2	—		I _C = 12A, V _{GE} = 15V, T _J = 175°C
		—	3.0	—		I _C = 20A, V _{GE} = 15V, T _J = 175°C
V _{GE(th)}	Gate Threshold Voltage	3.0	—	5.5	V	V _{CE} = V _{GE} , I _C = 250μA
ΔV _{GE(th)} /ΔT _J	Threshold Voltage temp. coefficient	—	-12	—	mV/°C	V _{CE} = V _{GE} , I _C = 1.0mA (25°C - 175°C)
g _{fe}	Forward Transconductance	—	36	—	S	V _{CE} = 50V, I _C = 20A
I _{CES}	Collector-to-Emitter Leakage Current	—	3.2	25	μA	V _{GE} = 0V, V _{CE} = 600V
		—	0.81	—	mA	V _{GE} = 0V, V _{CE} = 600V, T _J = 175°C
V _{FM}	Diode Forward Voltage Drop	—	1.7	2.45	V	I _F = 20A
		—	1.4	—		I _F = 20A, 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
Q _g	Total Gate Charge (turn-on)	—	180	270	nC	I _C = 20A
Q _{ge}	Gate-to-Emitter Charge (turn-on)	—	28	42		V _{GE} = 15V
Q _{gc}	Gate-to-Collector Charge (turn-on)	—	64	96		V _{CC} = 400V
E _{on}	Turn-On Switching Loss	—	298	389	μJ	I _C = 20A, V _{CC} = 400V, V _{GE} = 15V
E _{off}	Turn-Off Switching Loss	—	147	234		R _G = 4.7Ω, L = 485μH, T _J = 25°C
E _{total}	Total Switching Loss	—	445	623		Energy losses include tail & diode reverse recovery
t _{d(on)}	Turn-On delay time	—	35	53	ns	I _C = 20A, V _{CC} = 400V, V _{GE} = 15V
t _r	Rise time	—	12	29		R _G = 4.7Ω, L = 485μH, T _J = 25°C
t _{d(off)}	Turn-Off delay time	—	142	163		
t _f	Fall time	—	15	32		
E _{on}	Turn-On Switching Loss	—	630	—		μJ
E _{off}	Turn-Off Switching Loss	—	137	—	R _G = 4.7Ω, L = 485μH, T _J = 175°C	
E _{total}	Total Switching Loss	—	767	—	Energy losses include tail & diode reverse recovery	
t _{d(on)}	Turn-On delay time	—	33	—	ns	I _C = 20A, V _{CC} = 400V, V _{GE} = 15V
t _r	Rise time	—	12	—		R _G = 4.7Ω, L = 485μH
t _{d(off)}	Turn-Off delay time	—	165	—		T _J = 175°C
t _f	Fall time	—	16	—		
C _{ies}	Input Capacitance	—	4673	—		pF
C _{oes}	Output Capacitance	—	337	—	V _{CC} = 30V	
C _{res}	Reverse Transfer Capacitance	—	58	—	f = 1.0Mhz	
C _{oes eff.}	Effective Output Capacitance (Time Related) ⑤	—	406	—	V _{GE} = 0V, V _{CE} = 0V to 480V	
C _{oes eff. (ER)}	Effective Output Capacitance (Energy Related) ⑥	—	162	—		
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				
t _{rr}	Diode Reverse Recovery Time	—	41	—	ns	T _J = 25°C I _F = 20A, V _R = 200V,
		—	70	—		T _J = 125°C di/dt = 200A/μs
Q _{rr}	Diode Reverse Recovery Charge	—	116	—	nC	T _J = 25°C I _F = 20A, V _R = 200V,
		—	580	—		T _J = 125°C di/dt = 200A/μs
I _{rr}	Peak Reverse Recovery Current	—	4.8	—	A	T _J = 25°C I _F = 20A, V _R = 200V,
		—	7.2	—		T _J = 125°C di/dt = 200A/μs

Notes ① through ⑦ are on page 13