International
IOR Rectifier

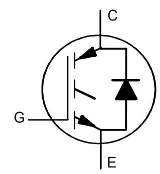
AUTOMOTIVE GRADE

AUIRGP66524D0
AUIRGF66524D0

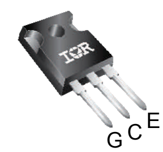
COOLiR*IGBT*™

INSULATED GATE BIPOLAR TRANSISTOR WITH ULTRAFAST SOFT RECOVERY DIODE

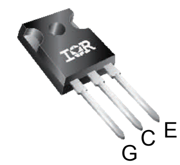
V_{CES} = 600V
$I_{NOMINAL}$ = 24A
Tsc ≥ 6µs, $T_{J(MAX)}$ = 175°C
$V_{CE(ON)}$ typ. = 1.60V



n-channel



TO-247AC
AUIRGP66524D0



TO-247AD
AUIRGF66524D0

G	C	E
Gate	Collector	Emitter

Applications
- Air Conditioning Compressor
- Auxiliary Motor Drive

Features →	**Benefits**
Low $V_{CE(on)}$ Trench IGBT Technology	High Efficiency in a Wide Range of Applications
Low Switching Losses	Suitable for a Wide Range of Switching Frequencies
6µs SCSOA Guaranteed	Enables Short Circuit Protection Scheme
Square RBSOA and 100% Clamp IL Tested	Rugged Hard Switching Operation
Positive $V_{CE(on)}$ Temperature Coefficient	Enables Easy Paralleling of Devices
Ultra Fast Soft Recovery Co-pak Diode	Better Efficiency and Improved EMI Performance
Lead-Free, RoHS Compliant, Automotive Qualified *	Environmentally Friendly

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
AUIRGP66524D0	TO-247AC	Tube	25	AUIRGP66524D0
AUIRGF66524D0	TO-247AD	Tube	25	AUIRGF66524D0

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
$I_{Nominal}$	Nominal Collector Current	24	A
I_C @ T_C = 25°C	Continuous Collector Current	60	
I_C @ T_C = 100°C	Continuous Collector Current	40	
I_{CM}	Pulse Collector Current, V_{GE} = 15V	72	
I_{LM}	Clamped Inductive Load Current, V_{GE} = 20V ①	96	
I_F @ T_C = 25°C	Diode Continous Forward Current	55	
I_F @ T_C = 100°C	Diode Continous Forward Current	35	
I_{FM}	Diode Maximum Forward Current ②	72	
V_{GE}	Continuous Gate-to-Emitter Voltage	±20	V
	Transient Gate-to-Emitter Voltage	±30	
dV/dt	Maximum Voltage Transient	15	V/ns
P_D @ T_C = 25°C	Maximum Power Dissipation	214	W
P_D @ T_C = 100°C	Maximum Power Dissipation	107	
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)	

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

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$ (IGBT)	Thermal Resistance Junction-to-Case (each IGBT) ④	——	0.7	°C/W
$R_{\theta JC}$ (Diode)	Thermal Resistance Junction-to-Case (each Diode) ④	——	1.1	
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink (flat, greased surface)	0.24	——	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (typical socket mount)	——	40	

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 = 100µA ③
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	0.21	—	V/°C	V_{GE}=0V, I_C=20mA (25°C-175°C)
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	1.60	1.90	V	I_C = 24A, V_{GE} = 15V, T_J = 25°C
		—	1.95	—		I_C = 24A, V_{GE} = 15V, T_J = 150°C
		—	2.0	—		I_C = 24A, V_{GE} = 15V, T_J = 175°C
$V_{GE(th)}$	Gate Threshold Voltage	5.5	6.5	7.5	V	V_{CE} = V_{GE}, I_C = 250µA
$\Delta V_{GE(th)}/\Delta TJ$	Threshold Voltage temp. coefficient	—	-28	—	mV/°C	V_{CE}=V_{GE}, I_C=1mA(25°C-175°C)
gfe	Forward Transconductance	—	21	—	S	V_{CE} = 50V, I_C = 24A, PW = 20µs
I_{CES}	Collector-to-Emitter Leakage Current	—	1.1	50	µA	V_{GE} = 0V, V_{CE} = 600V
V_{FM}	Diode Forward Voltage Drop	—	1.50	1.90	V	I_F = 24A
		—	1.40	—		I_F = 24A, 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)	—	50	80	nC	I_C = 24A
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	16	24		V_{GE} = 15V
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	26	39		V_{CC} = 400V
E_{on}	Turn-On Switching Loss	—	915	1045	µJ	I_C = 24A, V_{CC} = 400V, V_{GE} = 15V
E_{off}	Turn-Off Switching Loss	—	280	395		R_G = 10Ω, L = 740µH, T_J = 25°C
E_{total}	Total Switching Loss	—	1195	1440		Energy losses include tail & diode reverse recovery
$t_{d(on)}$	Turn-On delay time	—	30	50	ns	
t_r	Rise time	—	25	45		
$t_{d(off)}$	Turn-Off delay time	—	75	95		
t_f	Fall time	—	25	45		
E_{on}	Turn-On Switching Loss	—	1280	—	µJ	I_C = 24A, V_{CC} = 400V, V_{GE} = 15V
E_{off}	Turn-Off Switching Loss	—	550	—		R_G = 10Ω, L = 740µH, T_J = 175°C
E_{total}	Total Switching Loss	—	1830	—		Energy losses include tail & diode reverse recovery
$t_{d(on)}$	Turn-On delay time	—	30	—	ns	
t_r	Rise time	—	25	—		
$t_{d(off)}$	Turn-Off delay time	—	100	—		
t_f	Fall time	—	95	—		
C_{ies}	Input Capacitance	—	1460	—	pF	V_{GE} = 0V
C_{oes}	Output Capacitance	—	120	—		V_{CC} = 30V
C_{res}	Reverse Transfer Capacitance	—	50	—		f = 1.0Mhz
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T_J = 175°C, I_C = 96A V_{CC} = 480V, Vp ≤ 600V Rg = 10Ω, V_{GE} = +20V to 0V
SCSOA	Short Circuit Safe Operating Area	6	—	—	µs	T_J = 150°C, V_{CC} = 400V, Vp ≤600V Rg = 50Ω, V_{GE} = +15V to 0V
Erec	Reverse Recovery Energy of the Diode	—	570	—	µJ	T_J = 175°C
t_{rr}	Diode Reverse Recovery Time	—	176	—	ns	V_{CC} = 400V, I_F = 24A
I_{rr}	Peak Reverse Recovery Current	—	19	—	A	V_{GE} = 15V, Rg = 10Ω, L = 740µH

Notes:

① V_{CC} = 80% (V_{CES}), V_{GE} = 20V, L = 740µH, R_G = 10Ω.
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 approximately 90°C.

