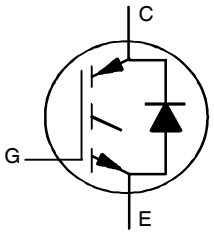
AUIRGP4066D1
AUIRGP4066D1-E

INSULATED GATE BIPOLAR TRANSISTOR WITH ULTRAFAST SOFT RECOVERY DIODE



n-channel

V_{CES} = 600V

$I_{C(Nominal)}$ = 75A

$t_{SC} \geq$ 5µs, $T_{J(max)}$ = 175°C

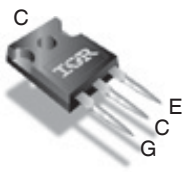
$V_{CE(on)}$ typ. = 1.70V

Features

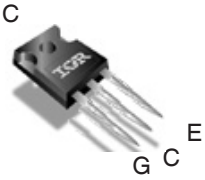
- Low $V_{CE\ (ON)}$ Trench IGBT Technology
- Low switching losses
- Maximum Junction temperature 175 °C
- 5 µS short circuit SOA
- Square RBSOA
- 100% of the parts tested for 4X rated current (I_{LM})①
- Positive $V_{CE\ (ON)}$ Temperature Coefficient
- Soft Recovery Co-Pak Diode
- Tight parameter distribution
- Lead-Free, RoHS Compliant
- Automotive Qualified *

Benefits

- High Efficiency in a wide range of applications
- Suitable for a wide range of switching frequencies due to Low $V_{CE\ (ON)}$ and Low Switching losses
- Rugged transient Performance for increased reliability
- Excellent Current sharing in parallel operation
- Low EMI



TO-247AC
AUIRGP4066D1



TO-247AD
AUIRGP4066D1-E

G	C	E
Gate	Collector	Emitter

Ordering Information

Base part number	Package Type	Standard Pack		Complete Part Number
		Form	Quantity	
AUIRGP4066D1	TO-247AC	Tube	25	AUIRGP4066D1
AUIRGP4066D1-E	TO-247AD	Tube	25	AUIRGP4066D1-E

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	140⑤	A
I_C @ T_C = 100°C	Continuous Collector Current	90	
$I_{NOMINAL}$	Nominal Current	75	
I_{CM}	Pulse Collector Current V_{GE} = 15V	225	
I_{LM}	Clamped Inductive Load Current V_{GE} = 20V ①	300	
$I_{F\ NOMINAL}$	Diode Nominal Current②	75⑤	
I_{FM}	Diode Maximum Forward Current ②	300	
V_{GE}	Continuous Gate-to-Emitter Voltage	±20	V
	Transient Gate-to-Emitter Voltage	±30	
P_D @ T_C = 25°C	Maximum Power Dissipation	454	W
P_D @ T_C = 100°C	Maximum Power Dissipation	227	
T_J	Operating Junction and	-55 to +175	°C
T_{STG}	Storage Temperature Range		
	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)	Thermal Resistance Junction-to-Case-(each IGBT) ④	—	—	0.33	°C/W
$R_{\theta JC}$ (Diode)	Thermal Resistance Junction-to-Case-(each Diode)④	—	—	0.53	
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink (flat, greased surface)	—	0.24	—	
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient (typical socket mount)	—	40	—	

*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 = 200µA ④
$\Delta V_{(BR)CES}/\Delta T_J$	Temperature Coeff. of Breakdown Voltage	—	0.30	—	V/°C	V_{GE} = 0V, I_C = 15mA (25°C-175°C)
$V_{CE(on)}$	Collector-to-Emitter Saturation Voltage	—	1.70	2.1	V	I_C = 75A, V_{GE} = 15V, T_J = 25°C ②
		—	2.0	—		I_C = 75A, V_{GE} = 15V, T_J = 150°C②
		—	2.1	—		I_C = 75A, V_{GE} = 15V, T_J = 175°C②
$V_{GE(th)}$	Gate Threshold Voltage	4.0	—	6.5	V	V_{CE} = V_{GE}, I_C = 2.1mA
$\Delta V_{GE(th)}/\Delta TJ$	Threshold Voltage temp. coefficient	—	-13	—	mV/°C	V_{CE} = V_{GE}, I_C = 20mA (25°C - 175°C)
gfe	Forward Transconductance	—	50	—	S	V_{CE} = 50V, I_C = 75A, PW = 25µs
I_{CES}	Collector-to-Emitter Leakage Current	—	3.0	200	µA	V_{GE} = 0V, V_{CE} = 600V
		—	10	—	mA	V_{GE} = 0V, V_{CE} = 600V, T_J = 175°C
V_{FM}	Diode Forward Voltage Drop	—	1.60	1.77	V	I_F = 75A
		—	1.54	—		I_F = 75A, 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)	—	150	225	nC	I_C = 75A
Q_{ge}	Gate-to-Emitter Charge (turn-on)	—	40	60		V_{GE} = 15V
Q_{gc}	Gate-to-Collector Charge (turn-on)	—	60	90		V_{CC} = 400V
E_{on}	Turn-On Switching Loss	—	4240	5190	µJ	I_C = 75A, V_{CC} = 400V, V_{GE} = 15V
E_{off}	Turn-Off Switching Loss	—	2170	3060		R_G = 10Ω, L = 100µH, T_J = 25°C
E_{total}	Total Switching Loss	—	6410	8250		Energy losses include tail & diode reverse recovery
$t_{d(on)}$	Turn-On delay time	—	50	70	ns	I_C = 75A, V_{CC} = 400V, V_{GE} = 15V
t_r	Rise time	—	80	100		R_G = 10Ω, L = 100µH
$t_{d(off)}$	Turn-Off delay time	—	200	230		TJ = 25°C
t_f	Fall time	—	60	80		
E_{on}	Turn-On Switching Loss	—	6210	—	µJ	I_C = 75A, V_{CC} = 400V, V_{GE}=15V
E_{off}	Turn-Off Switching Loss	—	2815	—		R_G=10Ω, L=100µH, T_J = 175°C
E_{total}	Total Switching Loss	—	9025	—		Energy losses include tail & diode reverse recovery
$t_{d(on)}$	Turn-On delay time	—	45	—	ns	I_C = 75A, V_{CC} = 400V, V_{GE}=15V
t_r	Rise time	—	70	—		R_G=10Ω, L=100µH
$t_{d(off)}$	Turn-Off delay time	—	240	—		T_J = 175°C
t_f	Fall time	—	80	—		
C_{ies}	Input Capacitance	—	4470	—	pF	V_{GE} = 0V
C_{oes}	Output Capacitance	—	350	—		V_{CC} = 30V
C_{res}	Reverse Transfer Capacitance	—	140	—		f = 1.0Mhz
RBSOA	Reverse Bias Safe Operating Area	FULL SQUARE				T_J = 175°C, I_C = 300A V_{CC} = 480V, Vp ≤600V Rg = 10Ω, V_{GE} = +20V to 0V
SCSOA	Short Circuit Safe Operating Area	5	—	—	µs	V_{CC} = 400V, Vp ≤600V Rg = 10Ω, V_{GE} = +15V to 0V
Erec	Reverse Recovery Energy of the Diode	—	680	—	µJ	T_J = 175°C
t_{rr}	Diode Reverse Recovery Time	—	240	—	ns	V_{CC} = 400V, I_F = 75A
I_{rr}	Peak Reverse Recovery Current	—	50	—	A	V_{GE} = 15V, Rg = 10Ω, L =100µH

Notes:

① V_{CC} = 80% (V_{CES}), V_{GE} = 20V, L = 100µH, R_G = 50Ω, tested in production I_{LM} ≤ 400A.

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. Package IGBT current limit is 120A. Package diode current limit is120A. Note that current limitations arising from heating of the device leads may occur.

