Ultrafast Rectifier
50 A, 600 V

RURG5060-F085

Description

The RURG5060−F085 is an ultrafast diode with soft recovery characteristics (trr< 90ns). It has low forward voltage drop and is silicon nitride passivated ionimplanted epitaxial planar construction.

This device is intended for use as a freewheeling/clamping diode and rectifier in a variety of switching power supplies and other power switching applications. Its low stored charge and ultrafast recovery with soft recovery characteristic minimizes ringing and electrical noise in many power switching circuits, thus reducing power loss in the switching transistors.

Features

- High Speed Switching (t_{rr} = 70 ns (Typ.) @ I_F = 50 A)
- Low Forward Voltage(V_F = 1.6 V (Max.) @ I_F = 50 A)
- Avalanche Energy Rated
- This Device is Pb−Free
- AEC−Q101 Qualified

Applications

- Automotive DCDC Converter
- Automotive On Board Charger
- Switching Power Supply
- Power Switching Circuits

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Reverse Voltage	V_{RRM}	600	V
Working Peak Reverse Voltage	V_{RWM}	600	V
DC Blocking Voltage	V_R	600	V
Average Rectified Forward Current @ T_C = 25 °C	$I_{F(AV)}$	50	A
Non−repetitive Peak Surge Current (Halfwave 1 Phase 50 Hz)	I_{FSM}	150	A
Avalanche Energy (1.4 A, 40 mH)	E_{AVL}	40	mJ
Operating Junction and Storage Temperature	T_J, T_{STG}	−55 to +175	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

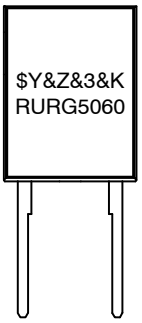
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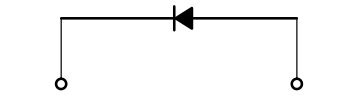


TO−247−2L
340CL

MARKING DIAGRAM



$Y	= ON Semiconductor Logo
&Z	= Assembly Plant Code
&3	= Numeric Date Code
&K	= Lot Code
RURG5060	= Specific Device Code



ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

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THERMAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Maximum Thermal Resistance, Junction to Case	0.4	°C/W
$R_{\theta JA}$	Maximum Thermal Resistance, Junction to Ambient	45	°C/W

PACKAGE MARKING AND ORDERING INFORMATION

Device Marking	Device	Package	Tube	Quantity
RURG5060	RURG5060−F085	TO−247	−	30

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
I_R	Instantaneous Reverse Current	V_R = 600 V	T_C = 25°C	−	−	250	uA
			T_C = 175°C	−	−	2	mA
V_{FM} (Note 1)	Instantaneous Forward Voltage	I_F = 50 A	T_C = 25°C	−	1.28	1.6	V
			T_C = 175°C	−	1.09	1.4	V
t_{rr} (Note 2)	Reverse Recovery Time	I_F = 1 A, di/dt = 100 A/μs, V_{CC} = 390 V	T_C = 25°C	−	42	65	ns
		I_F = 50 A, di/dt = 100 A/μs, V_{CC} = 390 V	T_C = 25°C	−	70	90	ns
			T_C = 175°C	−	285	−	ns
ta tb Q_{rr}	Reverse Recovery Time Reverse Recovery Charge	I_F = 50 A, di/dt = 100 A/μs, V_{CC} = 390 V	T_C = 25°C	−	36 34 112	− − −	ns ns nC
E_{AVL}	Avalanche Energy	I_{AV} = 1.4 A, L = 40mH		40	−	−	mJ

1. Pulse : Test Pulse width = 300 μs, Duty Cycle = 2%
2. Guaranteed by design

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TEST CIRCUITS AND WAVEFORMS

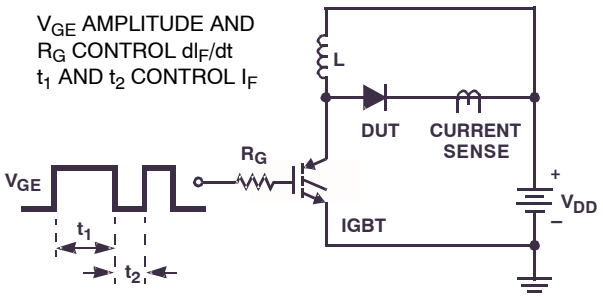


Figure 1. T_{rr} Test Circuit

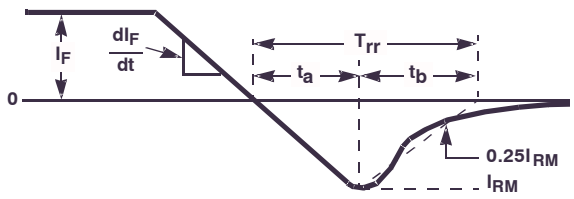


Figure 2. T_{rr} Waveforms and Definitions

I = 1.4 A
L = 40 mH
R < 0.1 Ω
$E_{AVL} = 1/2LI^2 [V_{R(AVL)}/(V_{R(AVL)}−V_{DD})]$
Q_1 = IGBT (BV_{CES} > DUT $V_{R(AVL)}$)

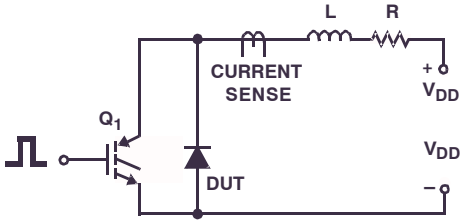


Figure 3. Avalanche Energy Test Circuit

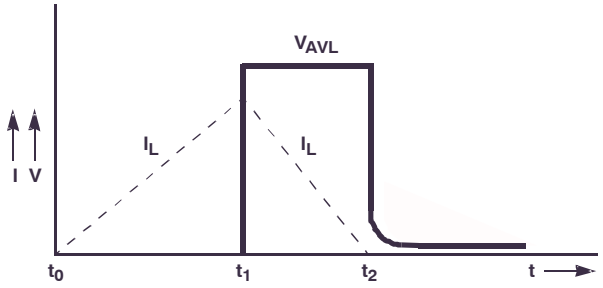


Figure 4. Avalanche Current and Voltage Waveforms

TYPICAL PERFORMANCE CHARECTERISTICS

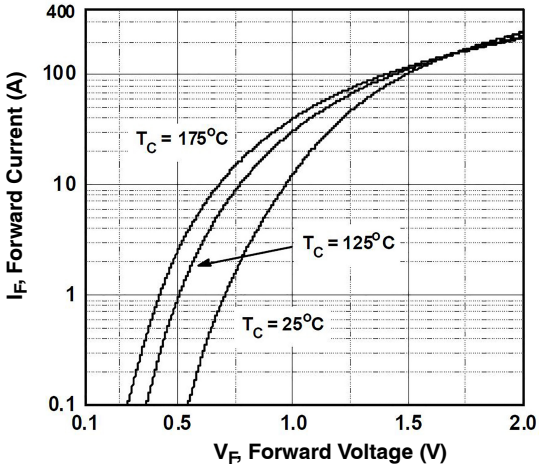


Figure 5. Typical Forward Voltage Drop vs. Forward Current

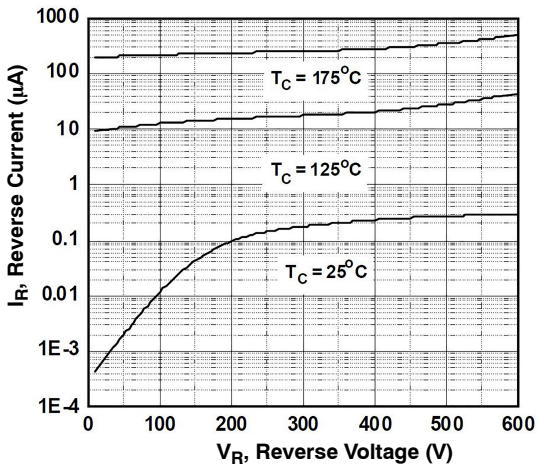


Figure 6. Typical Reverse Current vs. Reverse Voltage

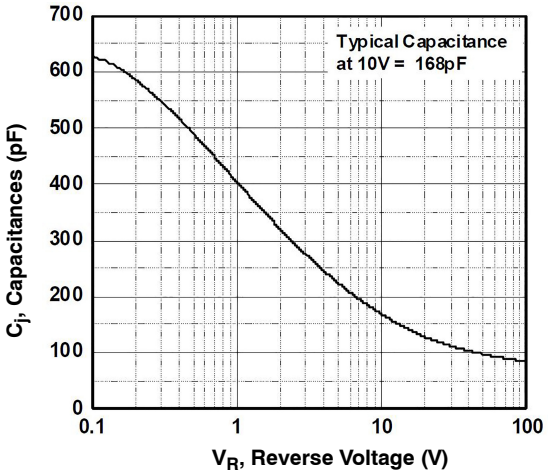


Figure 7. Typical Junction Capacitance

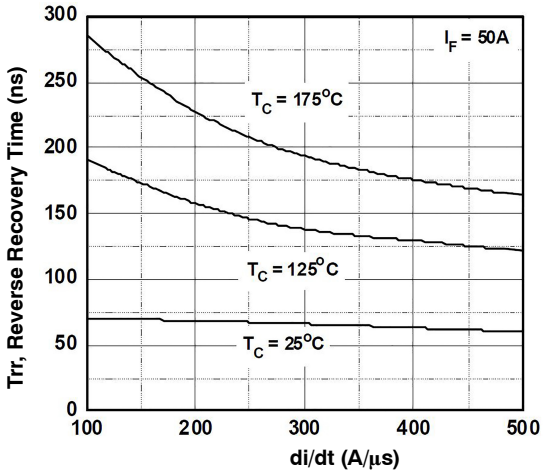


Figure 8. Typical Reverse Recovery Time vs. di/dt

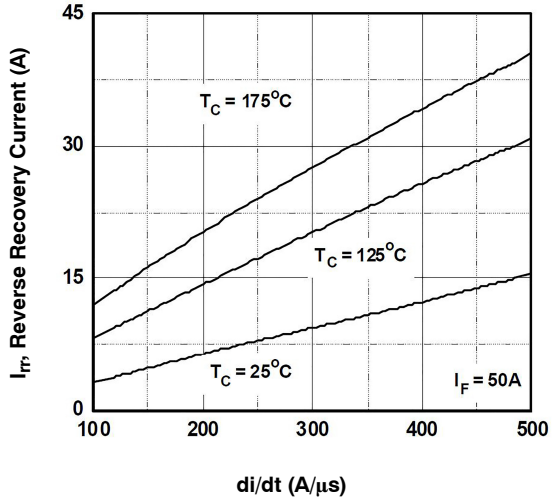


Figure 9. Typical Reverse Recovery Current vs. di/dt

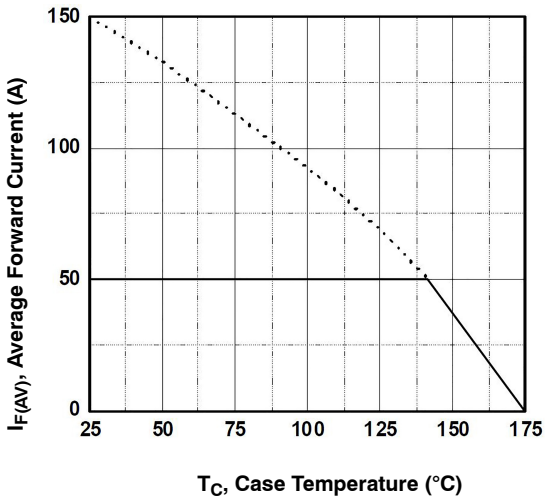


Figure 10. Forward Current Derating Curve

TYPICAL PERFORMANCE CHARACTERISTICS (continued)

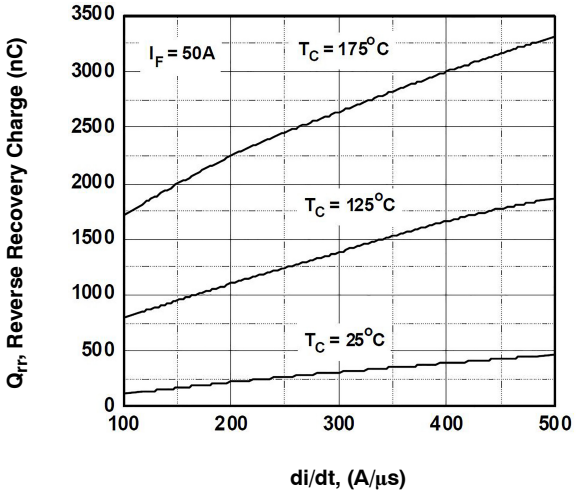


Figure 11. Reverse Recovery Charge

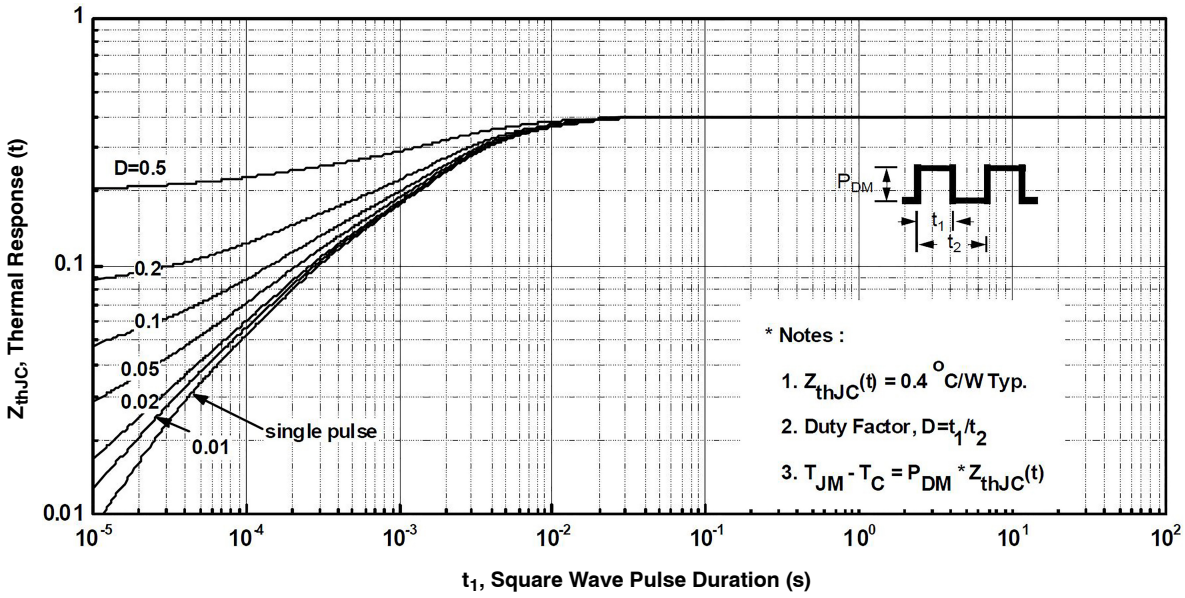


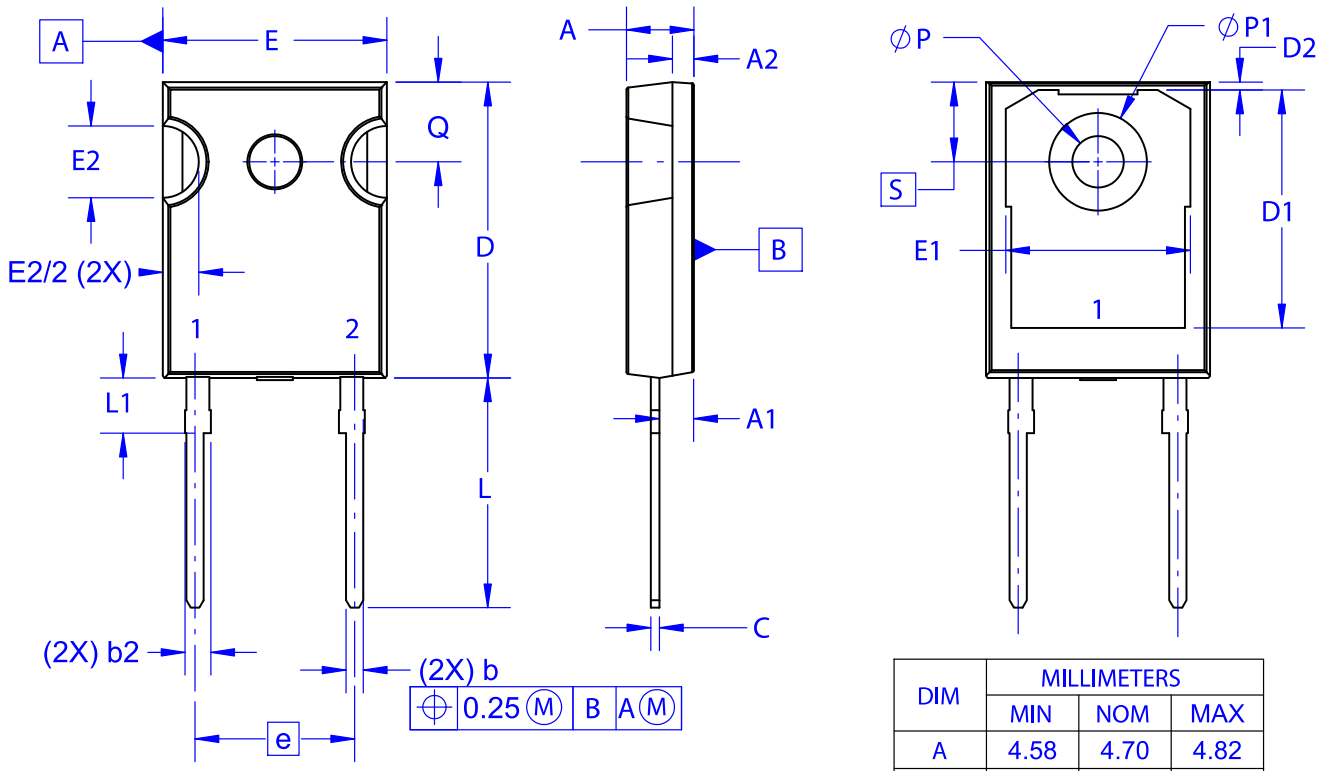
Figure 12. Transient Thermal Response Curve

MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS

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TO−247−2LD
CASE 340CL
ISSUE A

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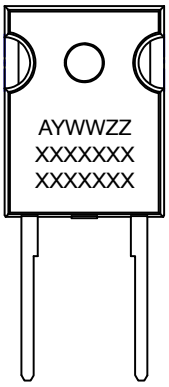


NOTES: UNLESS OTHERWISE SPECIFIED.

A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.29	2.40	2.66
A2	1.30	1.50	1.70
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
c	0.51	0.61	0.71
D	20.32	20.57	20.82
D1	16.37	16.57	16.77
D2	0.51	0.93	1.35
E	15.37	15.62	15.87
E1	12.81	~	~
E2	4.96	5.08	5.20
e	~	11.12	~
L	15.75	16.00	16.25
L1	3.69	3.81	3.93
ØP	3.51	3.58	3.65
ØP1	6.61	6.73	6.85
Q	5.34	5.46	5.58
S	5.34	5.46	5.58

GENERIC MARKING DIAGRAM*



XXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
ZZ = Assembly Lot Code

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

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