

RJH60D6DPQ-E0

600V - 40A - IGBT

Application: Inverter

R07DS0739EJ0100

Rev.1.00

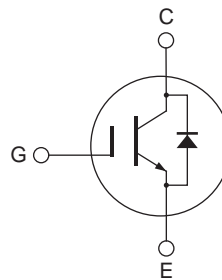
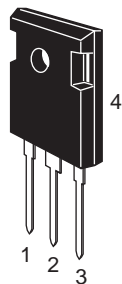
Apr 19, 2012

Features

- Short circuit withstand time (5 μ s typ.)
- Low collector to emitter saturation voltage
 $V_{CE(sat)} = 1.6$ V typ. (at $I_C = 40$ A, $V_{GE} = 15$ V, $T_a = 25^\circ\text{C}$)
- Built in fast recovery diode (100 ns typ.) in one package
- Trench gate and thin wafer technology
- High speed switching
 $t_f = 50$ ns typ. (at $V_{CC} = 300$ V, $V_{GE} = 15$ V, $I_C = 40$ A, $R_g = 5 \Omega$, $T_a = 25^\circ\text{C}$, inductive load)

Outline

RENESAS Package code: PRSS0003ZE-A
 (Package name: TO-247)



1. Gate
2. Collector
3. Emitter
4. Collector

Absolute Maximum Ratings

($T_a = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit	
Collector to emitter voltage / diode reverse voltage	V_{CES} / V_R	600	V	
Gate to emitter voltage	V_{GES}	± 30	V	
Collector current	$T_C = 25^\circ\text{C}$	I_C	80	A
	$T_C = 100^\circ\text{C}$	I_C	40	A
Collector peak current	$i_{c(peak)}$ ^{Note1}	160	A	
Collector to emitter diode forward current	i_{DF}	30	A	
Collector to emitter diode forward peak current	$i_{DF(peak)}$ ^{Note1}	120	A	
Collector dissipation	P_C ^{Note2}	260	W	
Junction to case thermal resistance (IGBT)	θ_{j-c} ^{Note2}	0.48	$^\circ\text{C} / \text{W}$	
Junction to case thermal resistance (Diode)	θ_{j-cd} ^{Note2}	2.10	$^\circ\text{C} / \text{W}$	
Junction temperature	T_j	150	$^\circ\text{C}$	
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$	

Notes: 1. $PW \leq 10 \mu\text{s}$, duty cycle $\leq 1\%$

2. Value at $T_C = 25^\circ\text{C}$

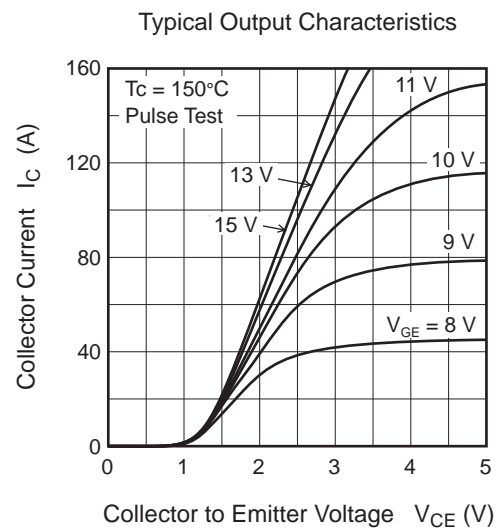
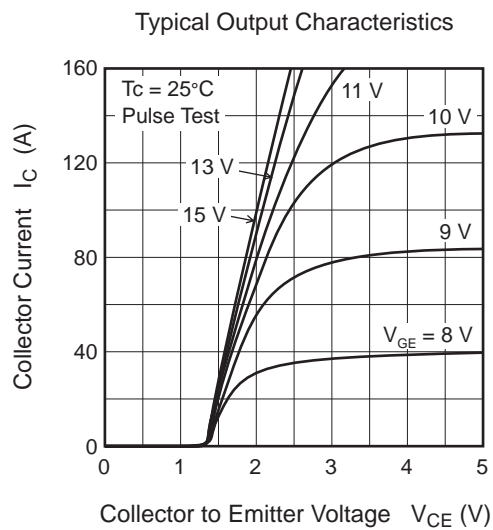
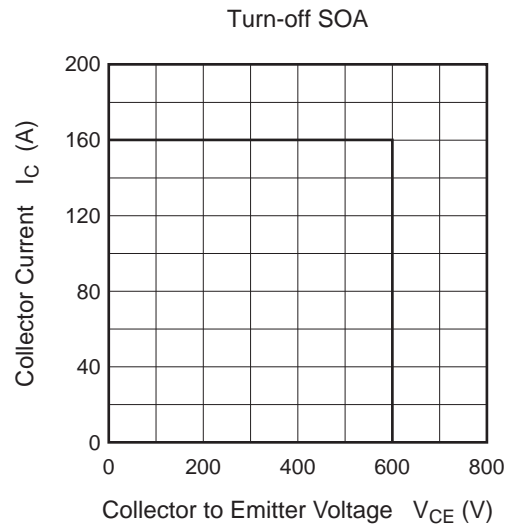
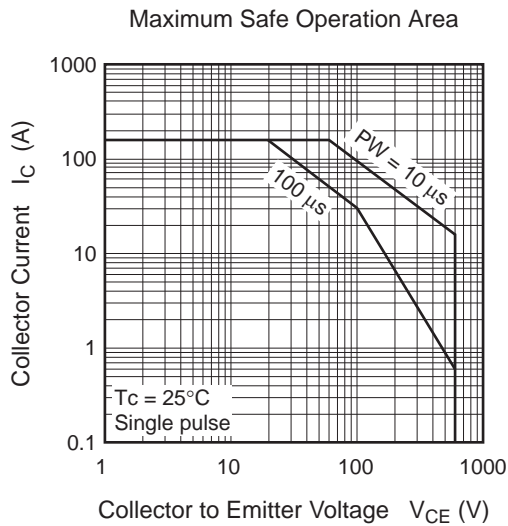
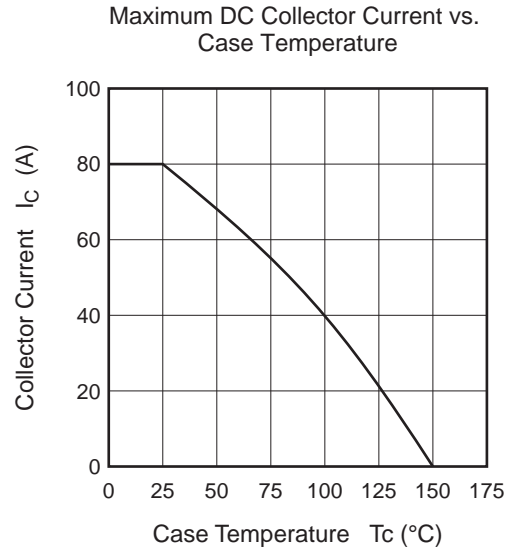
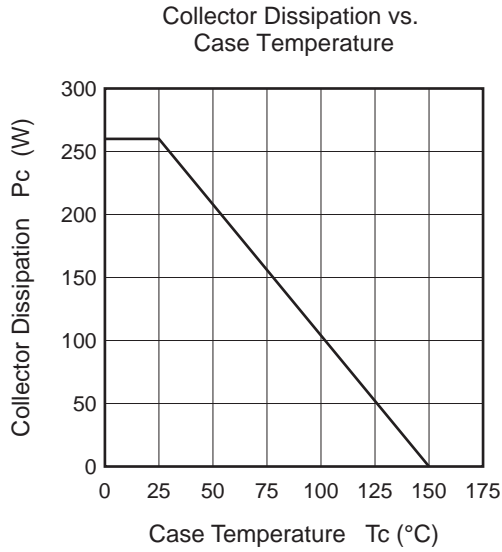
Electrical Characteristics

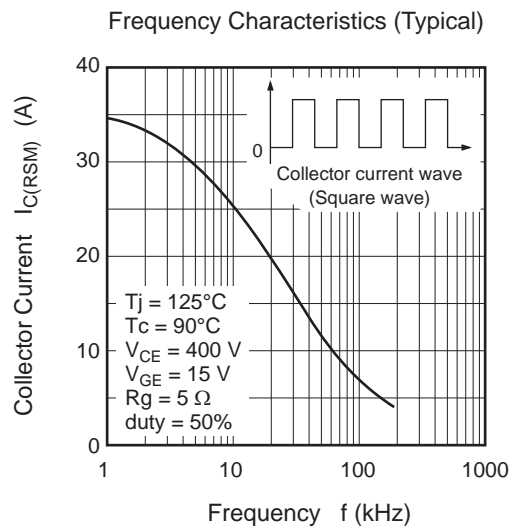
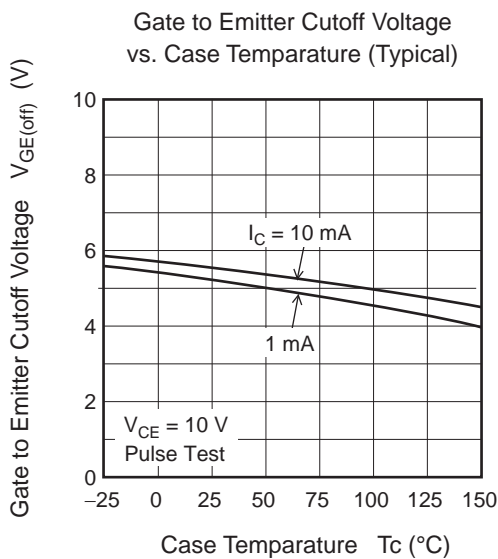
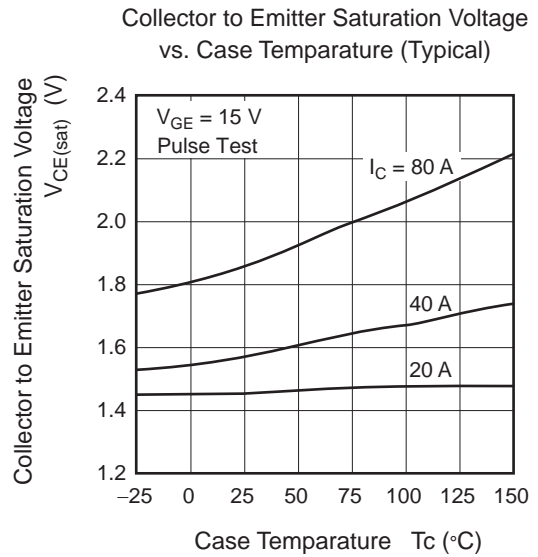
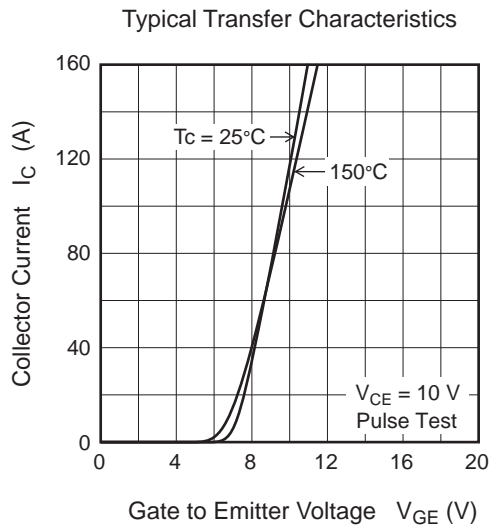
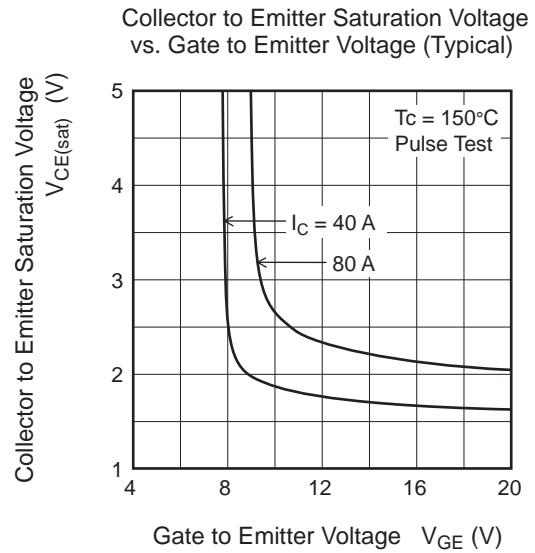
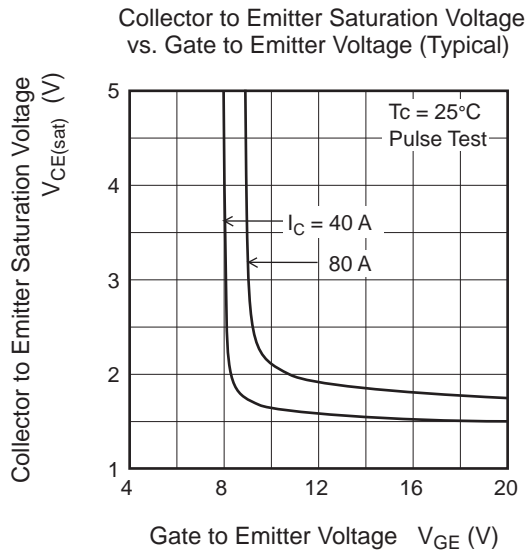
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to emitter breakdown voltage	$V_{BR(CES)}$	600	—	—	V	$I_C = 10 \mu A, V_{GE} = 0$
Zero gate voltage collector current / Diode reverse current	I_{CES} / I_R	—	—	5	μA	$V_{CE} = 600 V, V_{GE} = 0$
Gate to emitter leak current	I_{GES}	—	—	± 1	μA	$V_{GE} = \pm 30 V, V_{CE} = 0$
Gate to emitter cutoff voltage	$V_{GE(off)}$	4.0	—	6.0	V	$V_{CE} = 10 V, I_C = 1 mA$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	1.6	2.2	V	$I_C = 40 A, V_{GE} = 15 V$ ^{Note3}
	$V_{CE(sat)}$	—	1.8	—	V	$I_C = 80 A, V_{GE} = 15 V$ ^{Note3}
Input capacitance	C_{ies}	—	2500	—	pF	$V_{CE} = 25 V$
Output capacitance	C_{oes}	—	150	—	pF	$V_{GE} = 0$
Reveres transfer capacitance	C_{res}	—	70	—	pF	$f = 1 MHz$
Total gate charge	Q_g	—	104	—	nC	$V_{GE} = 15 V$
Gate to emitter charge	Q_{ge}	—	15	—	nC	$V_{CE} = 300 V$
Gate to collector charge	Q_{gc}	—	45	—	nC	$I_C = 40 A$
Turn-on delay time	$t_{d(on)}$	—	50	—	ns	$V_{CC} = 300 V$
Rise time	t_r	—	38	—	ns	$V_{GE} = 15 V$
Turn-off delay time	$t_{d(off)}$	—	160	—	ns	$I_C = 40 A$
Fall time	t_f	—	50	—	ns	$R_g = 5 \Omega$
Turn-on energy	E_{on}	—	0.85	—	mJ	(Inductive load)
Turn-off energy	E_{off}	—	0.60	—	mJ	
Total switching energy	E_{total}	—	1.45	—	mJ	
Short circuit withstand time	t_{sc}	3.0	5.0	—	μs	$V_{CC} \leq 360 V, V_{GE} = 15 V$
FRD forward voltage	V_F	—	1.4	1.9	V	$I_F = 30 A$ ^{Note3}
FRD reverse recovery time	t_{rr}	—	100	—	ns	$I_F = 30 A$
FRD reverse recovery charge	Q_{rr}	—	0.18	—	μC	$di_F/dt = 100 A/\mu s$
FRD peak reverse recovery current	I_{rr}	—	4.2	—	A	

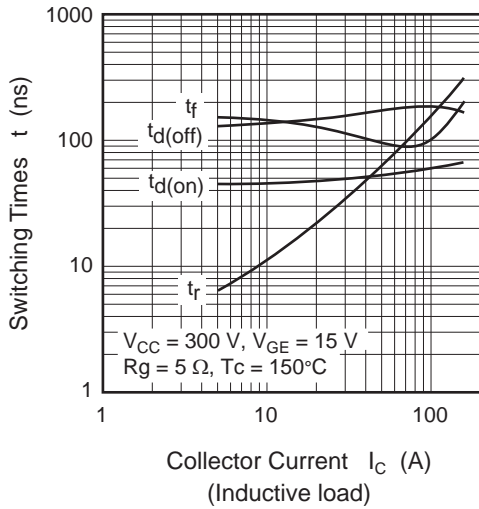
Notes: 3. Pulse test.

Main Characteristics

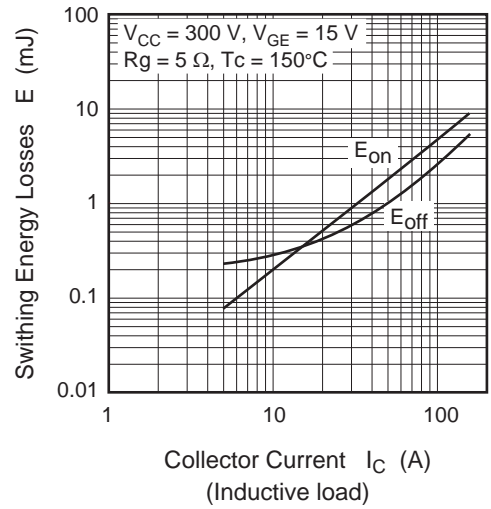




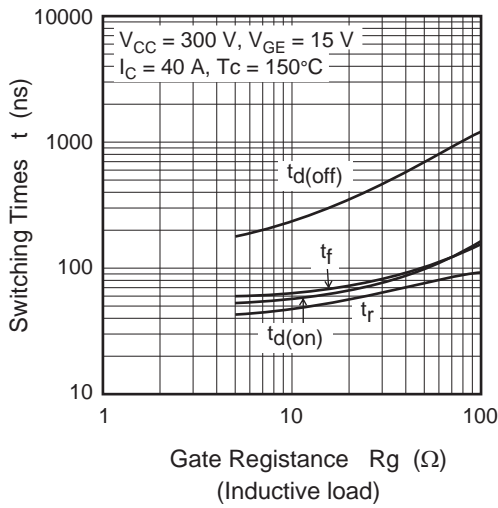
Switching Characteristics (Typical) (1)



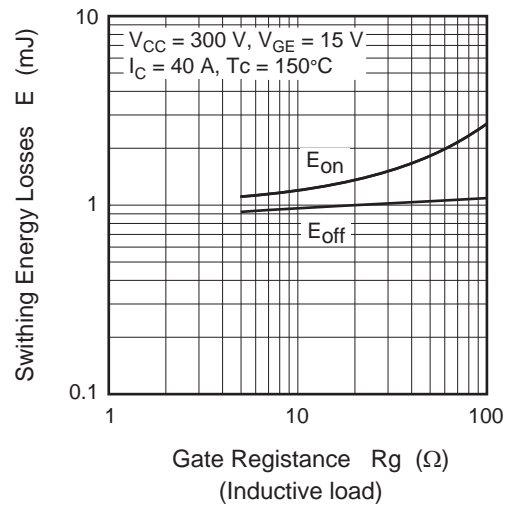
Switching Characteristics (Typical) (2)



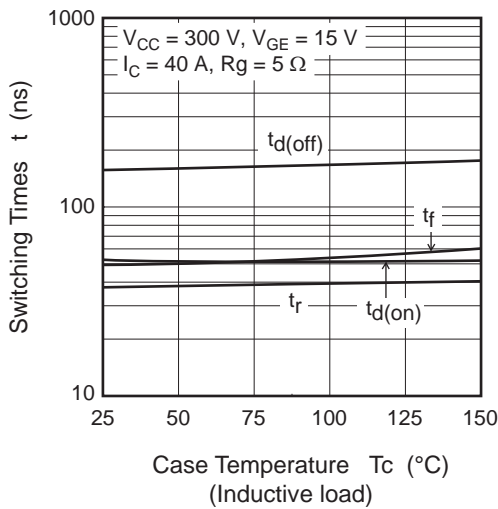
Switching Characteristics (Typical) (3)



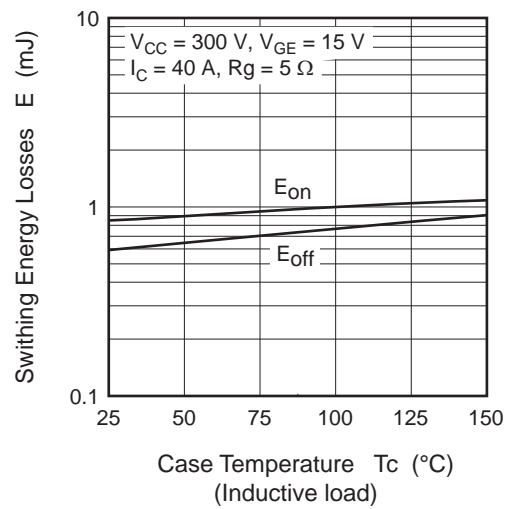
Switching Characteristics (Typical) (4)



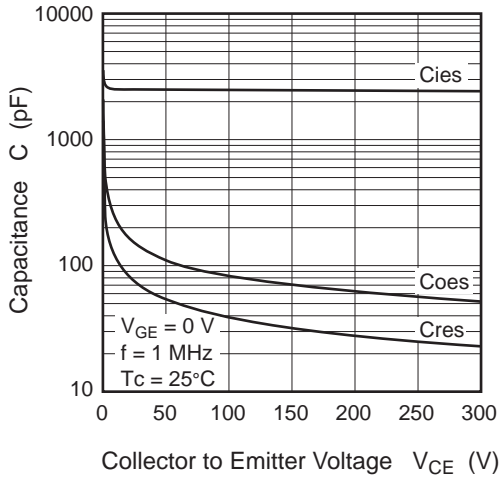
Switching Characteristics (Typical) (5)



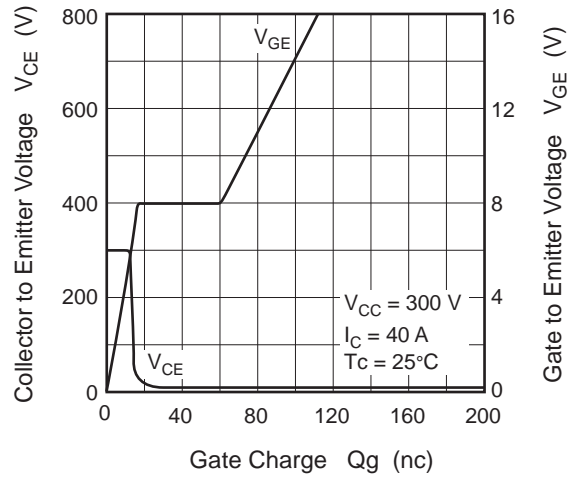
Switching Characteristics (Typical) (6)



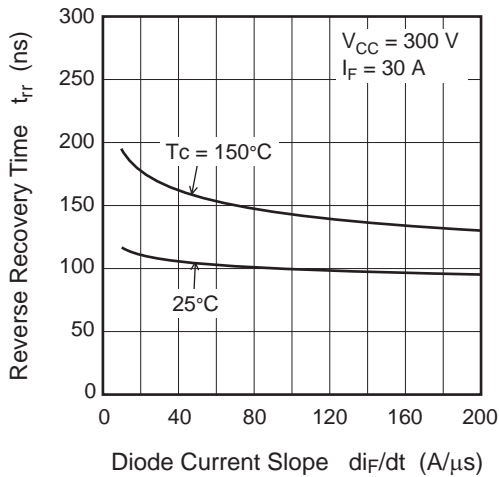
Typical Capacitance vs. Collector to Emitter Voltage



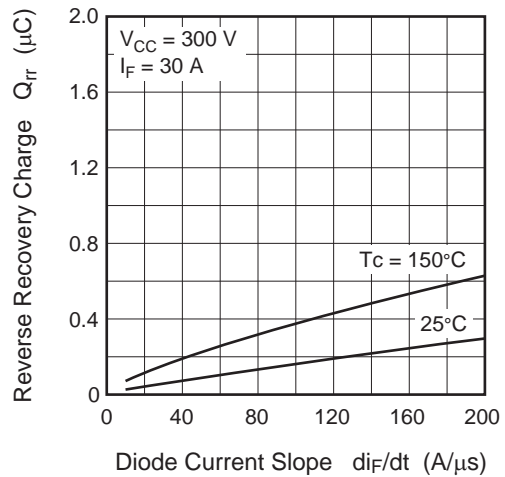
Dynamic Input Characteristics (Typical)



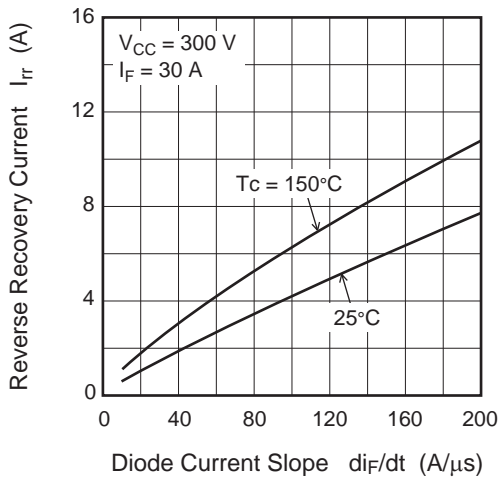
Reverse Recovery Time vs. Diode Current Slope (Typical)



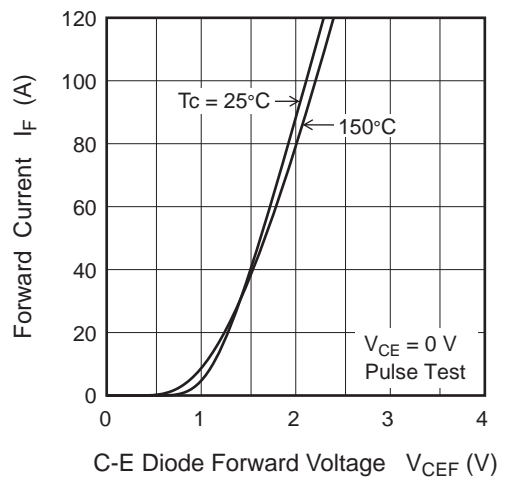
Reverse Recovery Charge vs. Diode Current Slope (Typical)

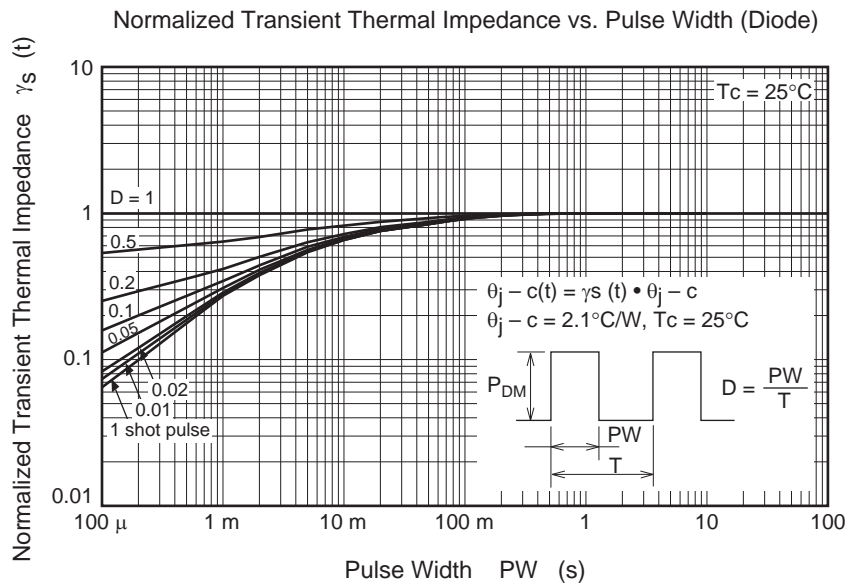
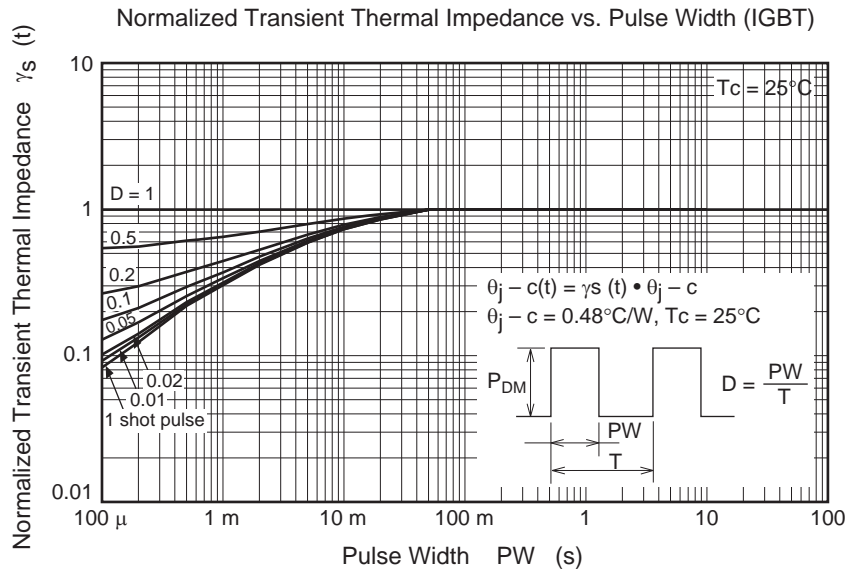


Reverse Recovery Current vs. Diode Current Slope (Typical)



Forward Current vs. Forward Voltage (Typical)





Switching Time Test Circuit



Waveform



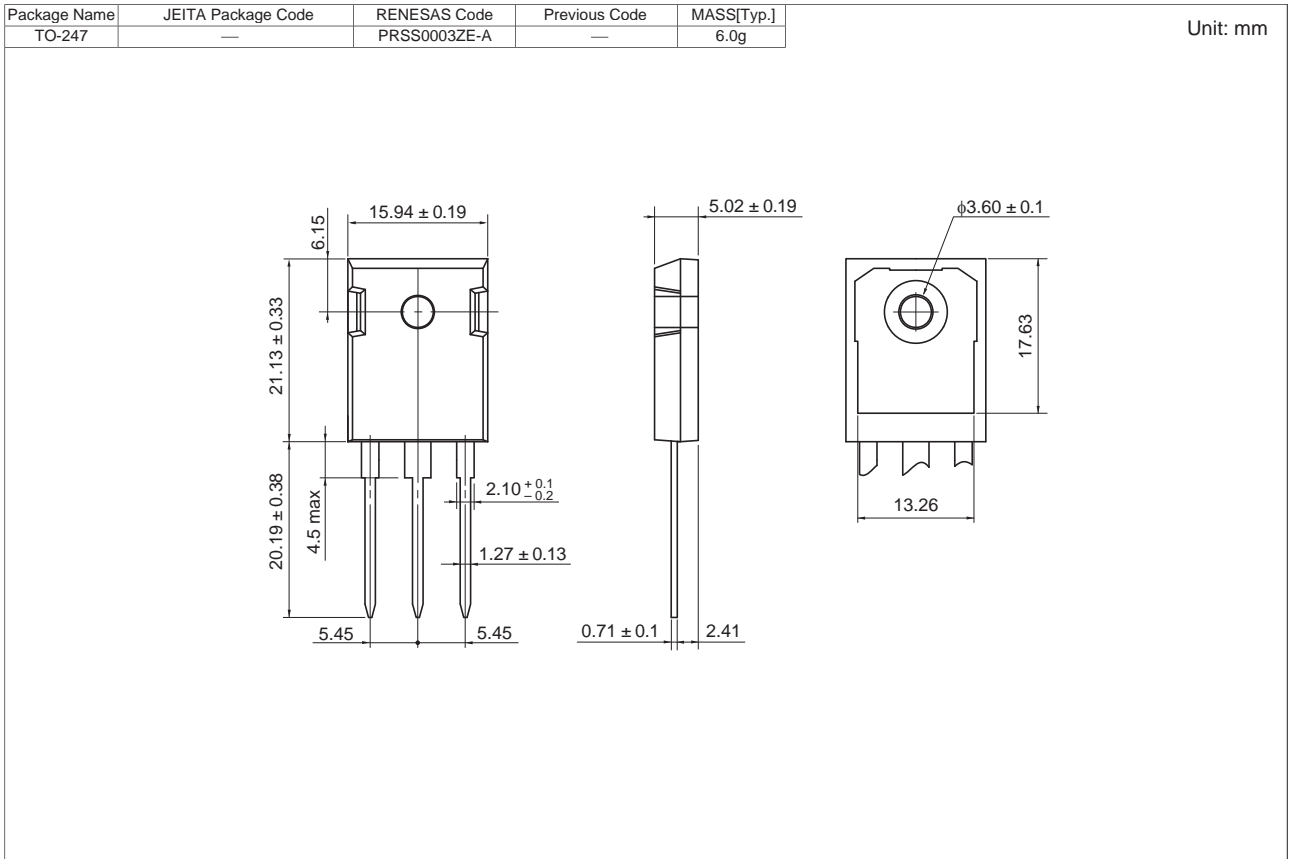
Diode Reverse Recovery Time Test Circuit



Waveform



Package Dimension



Ordering Information

Orderable Part No.	Quantity	Shipping Container
RJH60D6DPQ-E0#T2	240 pcs	Box (Tube)

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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-588-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
1 HarbourFront Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6278-8001

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jin Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141