

RJH65T46DPQ-A0

650V - 40A - IGBT

Application: Power Factor Correction circuit

R07DS1259EJ0100

Rev.1.00

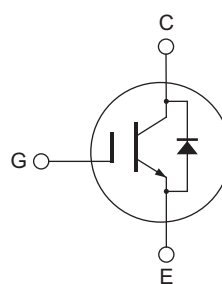
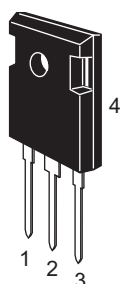
May 18, 2015

Features

- Low collector to emitter saturation voltage
 $V_{CE(sat)} = 1.8 \text{ V typ. (at } I_C = 40 \text{ A, } V_{GE} = 15 \text{ V, } T_a = 25^\circ\text{C)}$
- Built in fast recovery diode in one package
- Trench gate and thin wafer technology (G7H series)
- High speed switching
 $t_f = 45 \text{ ns typ. (at } V_{CC} = 400 \text{ V, } V_{GE} = 15 \text{ V, } I_C = 40 \text{ A, } R_g = 10 \Omega, T_a = 25^\circ\text{C, Inductive load)}$
- Operation frequency ($20\text{kHz} \leq f < 100\text{kHz}$)
- Not guarantee short circuit withstand time

Outline

RENESAS Package code: PRSS0003ZH-A
(Package name: TO-247A)



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

Absolute Maximum Ratings

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

Item	Symbol	Ratings	Unit
Collector to emitter voltage / diode reverse voltage	V_{CES} / V_R	650	V
Gate to emitter voltage	V_{GES}	± 30	V
Collector current	$T_c = 25^\circ\text{C}$	I_C	80
	$T_c = 100^\circ\text{C}$	I_C	40
Collector peak current	$i_{C(peak)}$ ^{Note1}	300	A
Collector to emitter diode Forward current	$T_c = 25^\circ\text{C}$	I_{DF}	30
	$T_c = 100^\circ\text{C}$	I_{DF}	15
Collector to emitter diode forward peak current	$i_{DF(peak)}$ ^{Note1}	100	A
Collector dissipation	P_C	340.9	W
Junction to case thermal impedance (IGBT)	θ_{j-c}	0.44	$^\circ\text{C/W}$
Junction to case thermal resistance (Diode)	θ_{j-cd}	1.33	$^\circ\text{C/W}$
Junction temperature	T_j ^{Note2}	175	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

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

2. Please use this device in the thermal conditions which the junction temperature does not exceed 175°C .
Renesas IGBT Application Note is disclosed about reliability test and application condition up to 175°C .

Electrical Characteristics

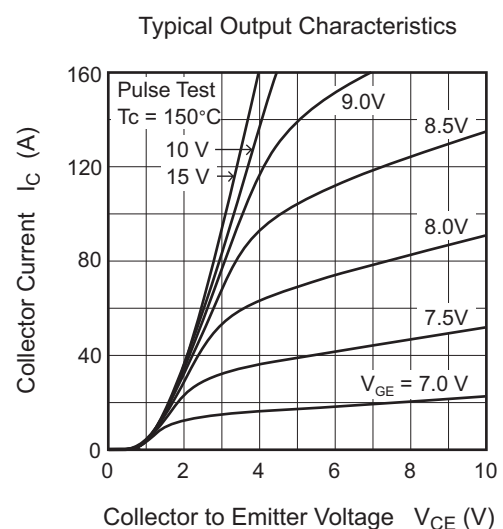
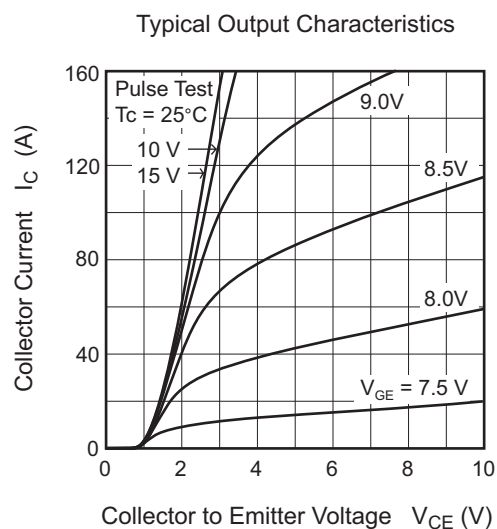
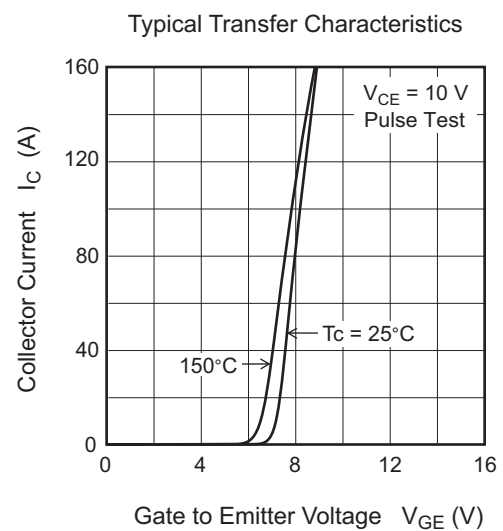
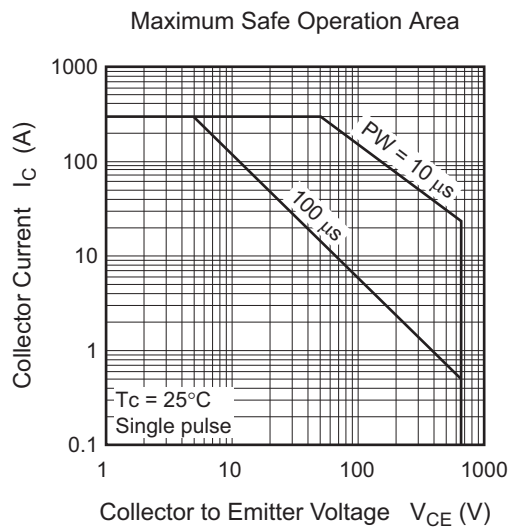
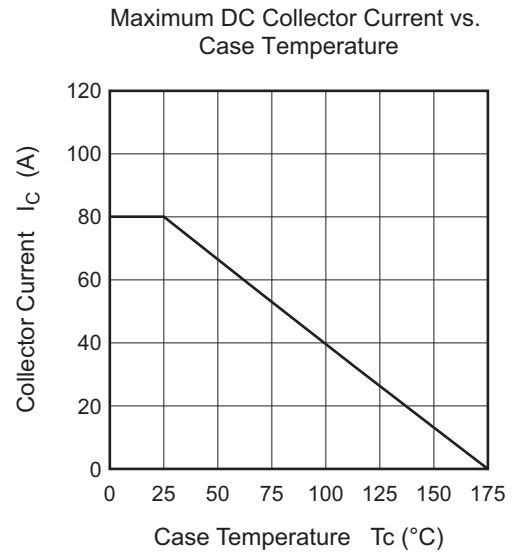
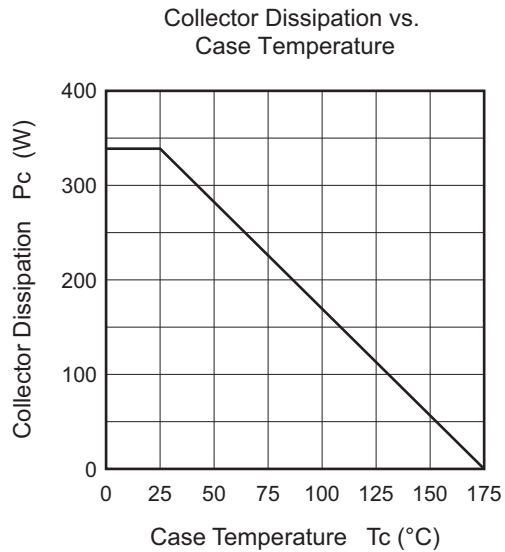
(Ta = 25°C)

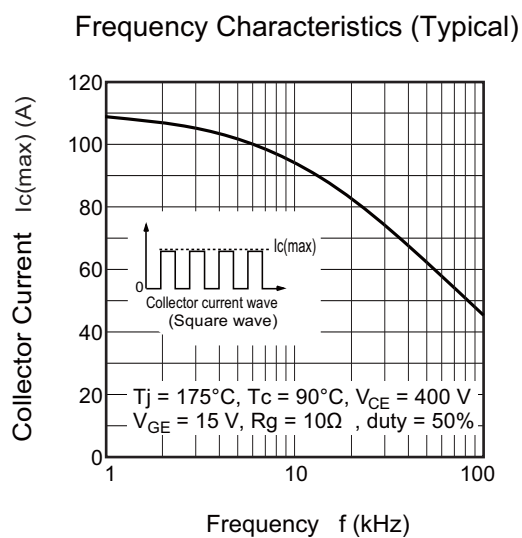
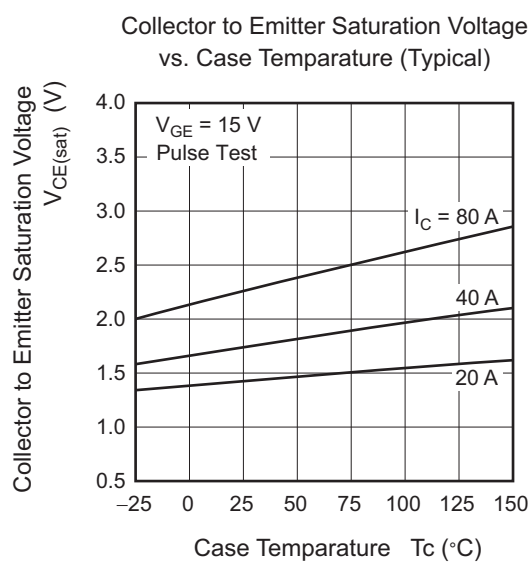
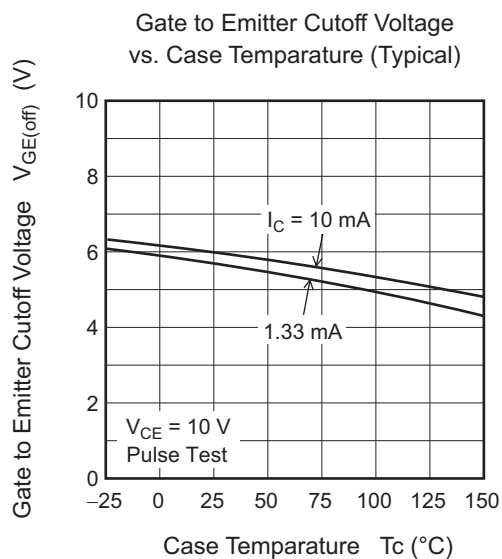
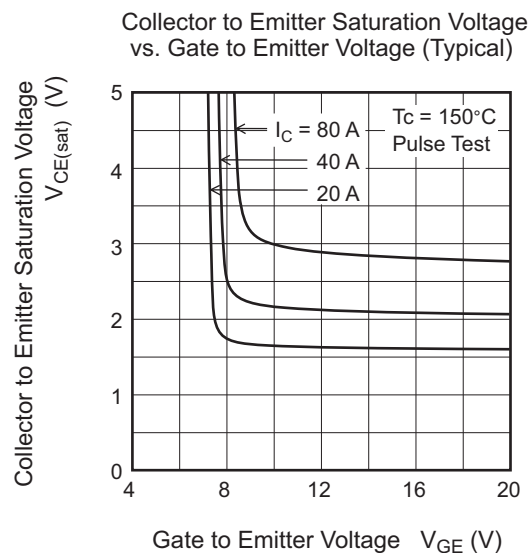
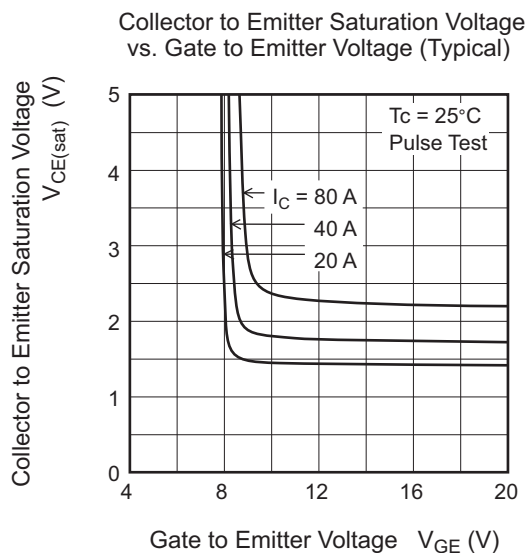
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current / Diode reverse current	I_{CES} / I_R	—	—	100	μA	$V_{CE} = 650 V, V_{GE} = 0$
Gate to emitter leak current	I_{GES}	—	—	± 1	μA	$V_{GE} = \pm 30 V, V_{CE} = 0$
Gate to emitter cutoff voltage	$V_{GE(off)}$	4.0	—	7.0	V	$V_{CE} = 10V, I_C = 1.33 mA$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	1.8	2.4	V	$I_C = 40 A, V_{GE} = 15V$ Note3
Input capacitance	C_{ies}	—	3000	—	pF	$V_{CE} = 25 V$ $V_{GE} = 0$ $f = 1 MHz$
Output capacitance	C_{oes}	—	92	—	pF	
Reveres transfer capacitance	C_{res}	—	55	—	pF	
Total gate charge	Q_g	—	138	—	nC	$V_{GE} = 15 V$ $V_{CE} = 400 V$ $I_C = 40 A$
Gate to emitter charge	Q_{ge}	—	22	—	nC	
Gate to collector charge	Q_{gc}	—	57	—	nC	
Turn-on delay time	$t_{d(on)}$	—	45	—	ns	$V_{CC} = 400 V$ $V_{GE} = 15 V$ $I_C = 40 A$ $R_g = 10 \Omega$ $T_C = 25^\circ C$ Inductive load Note4
Rise time	t_r	—	30	—	ns	
Turn-off delay time	$t_{d(off)}$	—	170	—	ns	
Fall time	t_f	—	45	—	ns	
Turn-on loss energy	E_{on}	—	0.45	—	mJ	
Turn-off loss energy	E_{off}	—	0.55	—	mJ	
Total switching energy	E_{total}	—	1.00	—	mJ	
Turn-on delay time	$t_{d(on)}$	—	45	—	ns	
Rise time	t_r	—	30	—	ns	
Turn-off delay time	$t_{d(off)}$	—	185	—	ns	
Fall time	t_f	—	50	—	ns	$V_{CC} = 400 V$ $V_{GE} = 15 V$ $I_C = 40 A$ $R_g = 10 \Omega$ $T_C = 150^\circ C$ Inductive load Note4
Turn-on loss energy	E_{on}	—	0.57	—	mJ	
Turn-off loss energy	E_{off}	—	0.63	—	mJ	
Total switching energy	E_{total}	—	1.20	—	mJ	
FRD forward voltage	V_F	—	1.7	2.2	V	$I_F = 15 A$ Note3
FRD reverse recovery time	t_{rr}	—	100	—	ns	$I_F = 15 A, di_F/dt = 300 A/\mu s$

Notes: 3. Pulse test

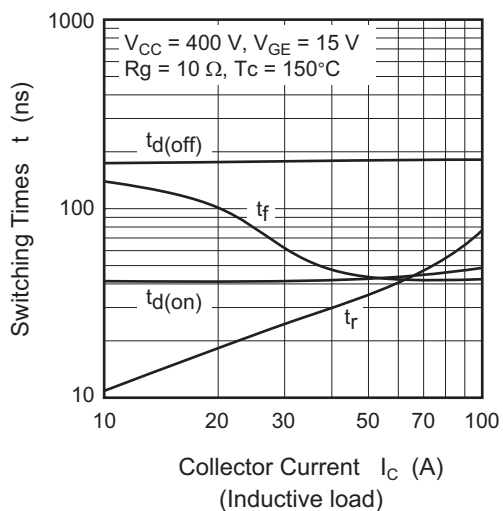
4. Switching time test circuit and waveform are shown below.

Main Characteristics

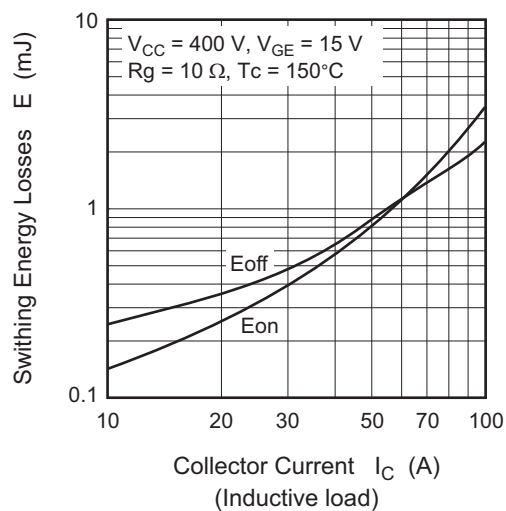




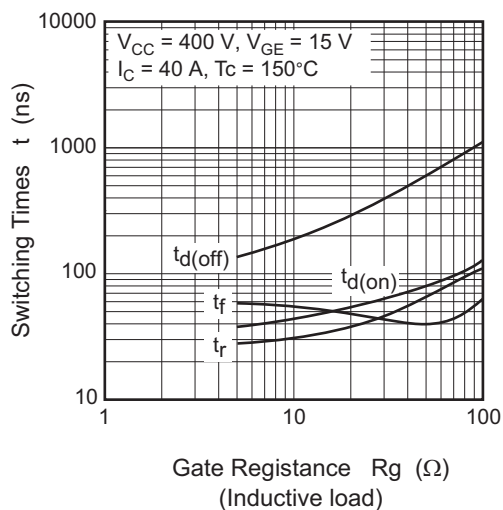
Switching Characteristics (Typical) (1)



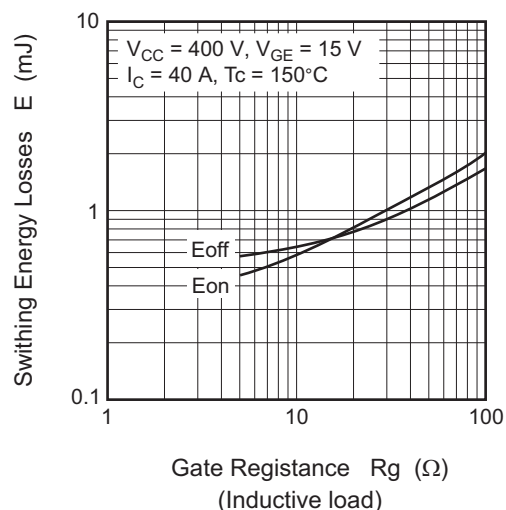
Switching Characteristics (Typical) (2)



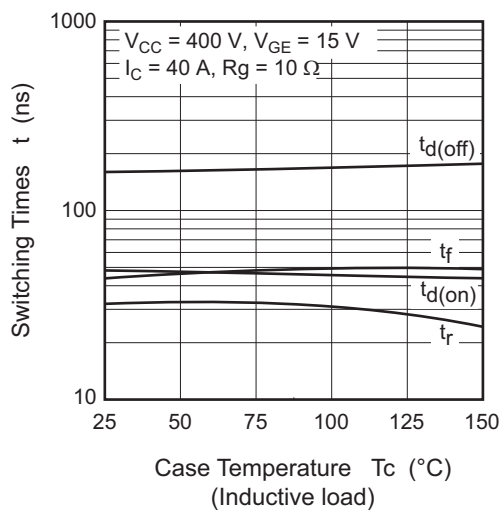
Switching Characteristics (Typical) (3)



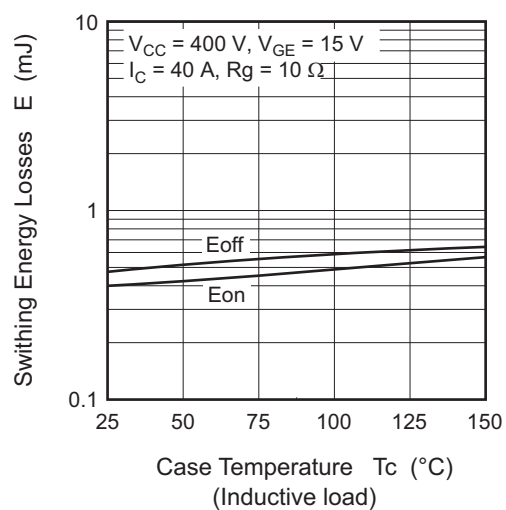
Switching Characteristics (Typical) (4)



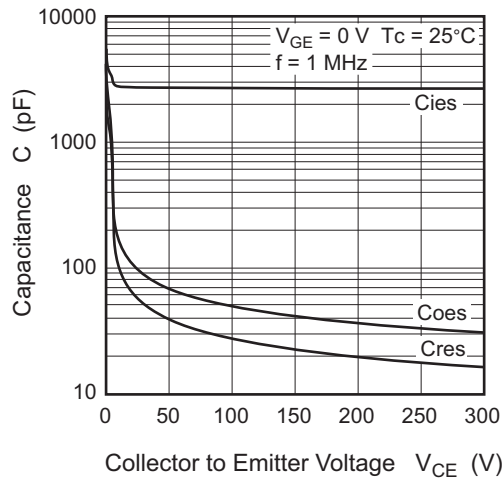
Switching Characteristics (Typical) (5)



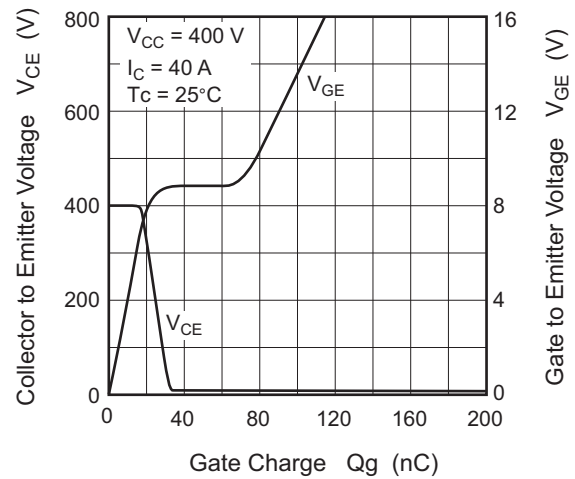
Switching Characteristics (Typical) (6)



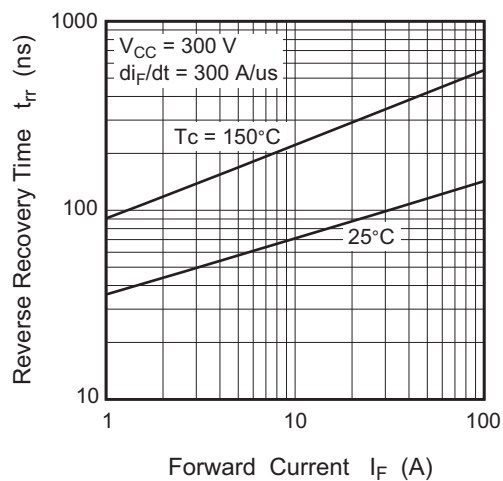
Typical Capacitance vs.
Collector to Emitter Voltage



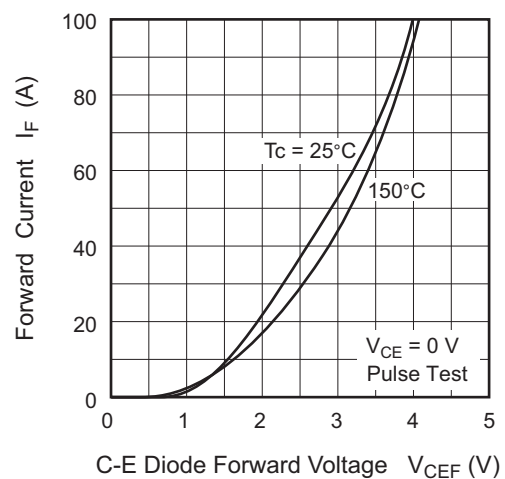
Dynamic Input Characteristics (Typical)

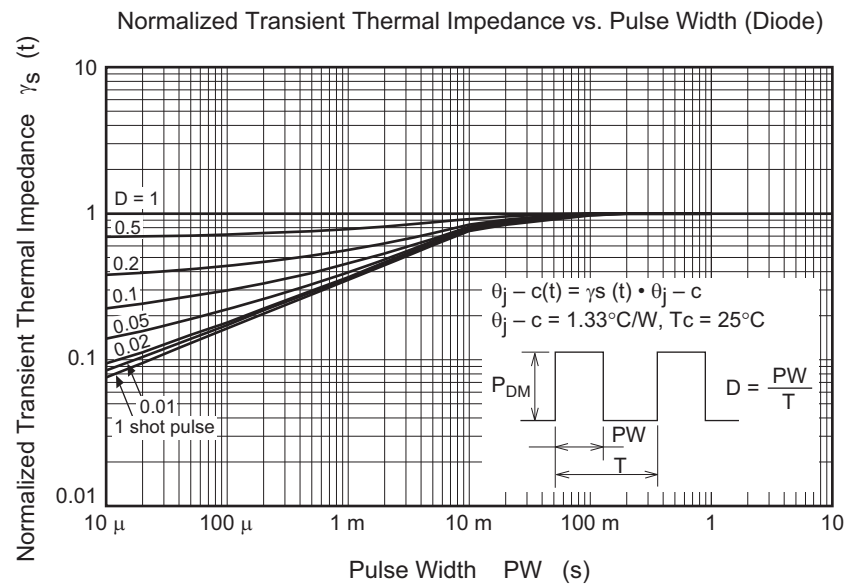
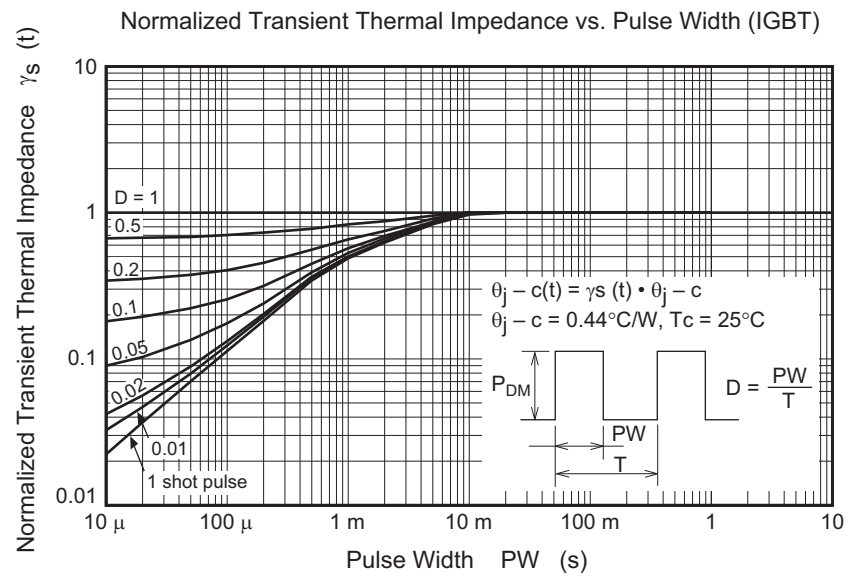


Reverse Recovery Time vs.
Forward Current (Typical)

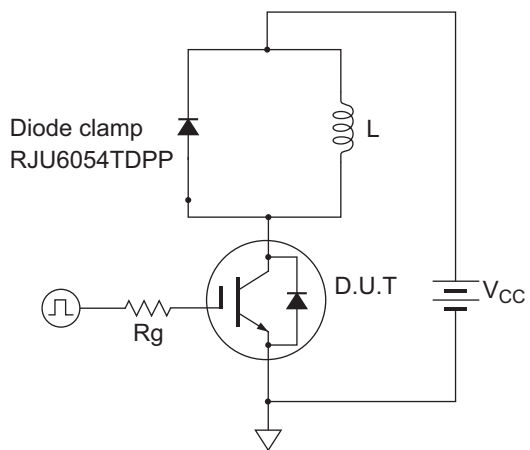


Forward Current vs. Forward Voltage (Typical)

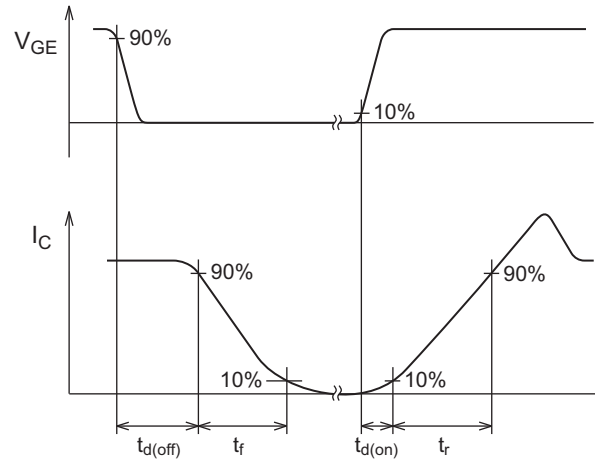




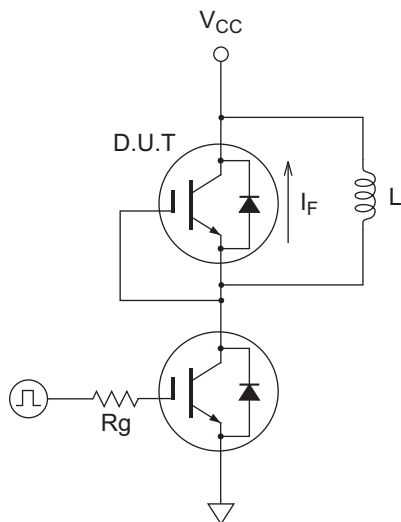
Switching Time Test Circuit



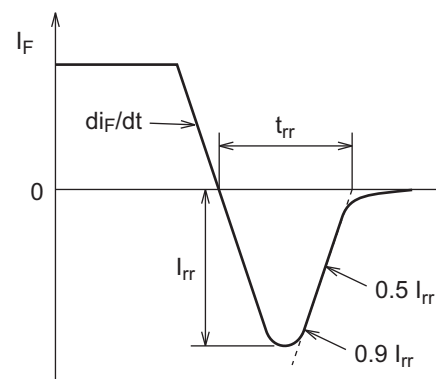
Waveform



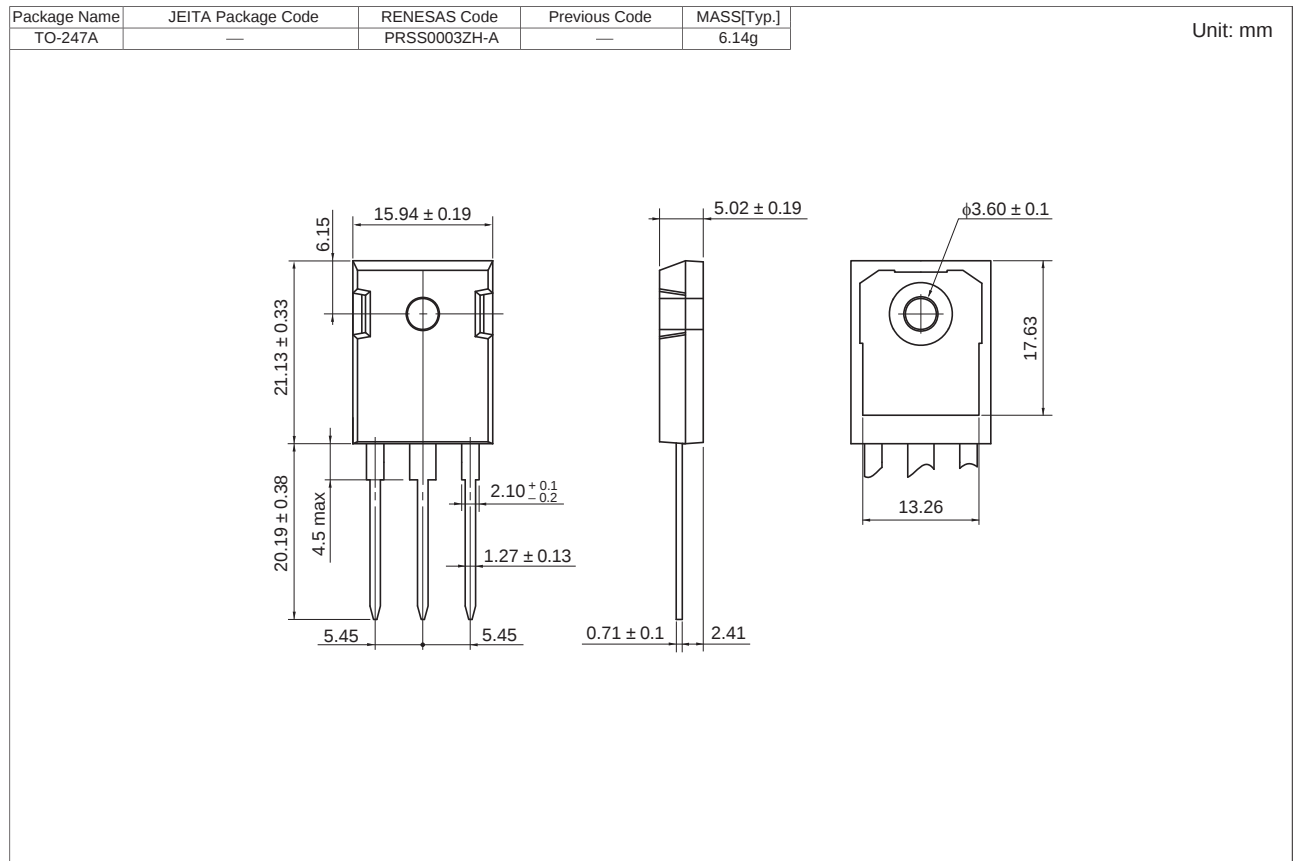
Diode Reverse Recovery Time Test Circuit



Waveform



Package Dimensions



Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJH65T46DPQ-A0#T0	240 pcs	Box (Tube)

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