

RJQ6008BDPM

600V - 6A - IGBT
Power Switching

R07DS1489EJ0200

Rev.2.00

Nov.19.2020

Features

- Built in fast recovery diode in one package
- Low collector to emitter saturation voltage
 $V_{CE(sat)} = 1.8 \text{ V typ. (at } I_C = 20 \text{ A, } V_{GE} = 15\text{V, } T_C = 25 \text{ °C)}$
- Quality grade: Standard
- High speed switching
- Applications: PFC

Key Performance

Type	V_{CES}	I_C	$V_{CE(sat), T_C=25^\circ\text{C}}$	I_F	T_j
RJQ6008BDPM	600 V	20 A	1.8 V	20 A	150 °C

Outline

RENESAS Package code: PRSS0005ZB-A
(Package name: TO-3PFM-5)

1. Anode, Collector
2. Cathode
3. Anode, Collector
4. Emitter
5. Gate

Absolute Maximum Ratings

IGBT

($T_C = 25 \text{ °C}$)

Item	Symbol	Ratings	Unit
Collector to emitter voltage	V_{CES}	600	V
Gate to emitter voltage	V_{GES}	± 30	V
Collector current	$T_C = 25 \text{ °C}$	I_C	13
	$T_C = 100 \text{ °C}$	I_C	6
Collector peak current	$I_{C(peak)}$ Notes1	100	A
Collector power dissipation	P_C Notes2	29	W
Junction temperature	T_j Notes2	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

Note: Continuous heavy condition (e.g. high temperature/voltage/current or high variation of temperature) may affect a reliability even if it is within the absolute maximum ratings. Please consider derating condition for appropriate reliability in reference Renesas Semiconductor Reliability Handbook (Recommendation for Handling and Usage of Semiconductor Devices) and individual reliability data.

- Notes: 1. Pulse width limited by safe operating area.
2. Heat dissipation so that the junction temperature is 150 °C or lower.

Diode

(Tc = 25 °C)

Item		Symbol	Ratings	Unit
Maximum reverse voltage		V_{RM}	600	V
Diode forward current		I_F	20	A
Peak surge forward current	PW = 10 ms ^{Notes3}	IFSM	100	A
	PW = 1 ms ^{Notes4}	IFSM	190	A
Junction temperature		T_j ^{Notes2}	150	°C
Storage temperature		T_{stg}	-55 to +150	°C

Note: Continuous heavy condition (e.g. high temperature/voltage/current or high variation of temperature) may affect a reliability even if it is within the absolute maximum ratings. Please consider derating condition for appropriate reliability in reference Renesas Semiconductor Reliability Handbook (Recommendation for Handling and Usage of Semiconductor Devices) and individual reliability data.

Notes: 3. 50Hz sine half wave, Non-repetitive 1 cycle value, $T_j = 25^\circ\text{C}$.

4. PW = 1ms sine half wave, Non-repetitive peak value, $T_j = 25^\circ\text{C}$.

Thermal Resistance Characteristics

(Tc = 25 °C)

Item	Symbol	Max. Value ^{Notes5}	Unit
Junction to case thermal impedance (IGBT)	$R_{th(j-c)}$	4.2	°C/W
Junction to case thermal resistance (Diode)	$R_{th(j-c)}$	3.0	°C/W

Notes: 5. Designed target value on Renesas measurement condition. (Not tested)

Electrical Characteristics

IGBT

(T_c = 25 °C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to emitter leakage current	I _{CES}	—	—	10	μA	V _{CE} = 600 V, V _{GE} = 0 V
Gate to emitter leakage current	I _{GES}	—	—	±1	μA	V _{GE} = ±30 V, V _{CE} = 0 V
Gate to emitter threshold voltage	V _{GE(th)}	4.0	—	7.0	V	V _{CE} = 10 V, I _C = 0.67 mA
Collector to emitter saturation voltage	V _{CE(sat)}	—	1.8	2.4	V	I _C = 20 A, V _{GE} = 15V Notes6, 7
Input capacitance	C _{ies}	—	1320	—	pF	V _{CE} = 25 V
Output capacitance	C _{oes}	—	37	—	pF	V _{GE} = 0 V
Reverse transfer capacitance	C _{res}	—	26	—	pF	f = 1 MHz
Total gate charge	Q _g	—	70	—	nC	V _{GE} = 15 V
Gate to emitter charge	Q _{ge}	—	8	—	nC	V _{CE} = 400 V
Gate to collector charge	Q _{gc}	—	31	—	nC	I _C = 13 A
Turn-on delay time	t _{d(on)}	—	31	—	ns	V _{CC} = 400 V
Rise time	t _r	—	20	—	ns	V _{GE} = 15 V
Turn-off delay time	t _{d(off)}	—	107	—	ns	I _C = 20 A
Fall time	t _f	—	28	—	ns	R _g = 10 Ω
Turn-on loss energy	E _{on}	—	0.51	—	mJ	T _c = 25 °C
Turn-off loss energy	E _{off}	—	0.11	—	mJ	Inductive load Notes8
Total switching energy	E _{total}	—	0.62	—	mJ	
Turn-on delay time	t _{d(on)}	—	29	—	ns	V _{CC} = 400 V
Rise time	t _r	—	17	—	ns	V _{GE} = 15 V
Turn-off delay time	t _{d(off)}	—	114	—	ns	I _C = 20 A
Fall time	t _f	—	51	—	ns	R _g = 10 Ω
Turn-on loss energy	E _{on}	—	0.67	—	mJ	T _c = 150 °C
Turn-off loss energy	E _{off}	—	0.24	—	mJ	Inductive load Notes8
Total switching energy	E _{total}	—	0.91	—	mJ	

Notes: 6. Pulse test

7. Measured between Pins 3 and 4.

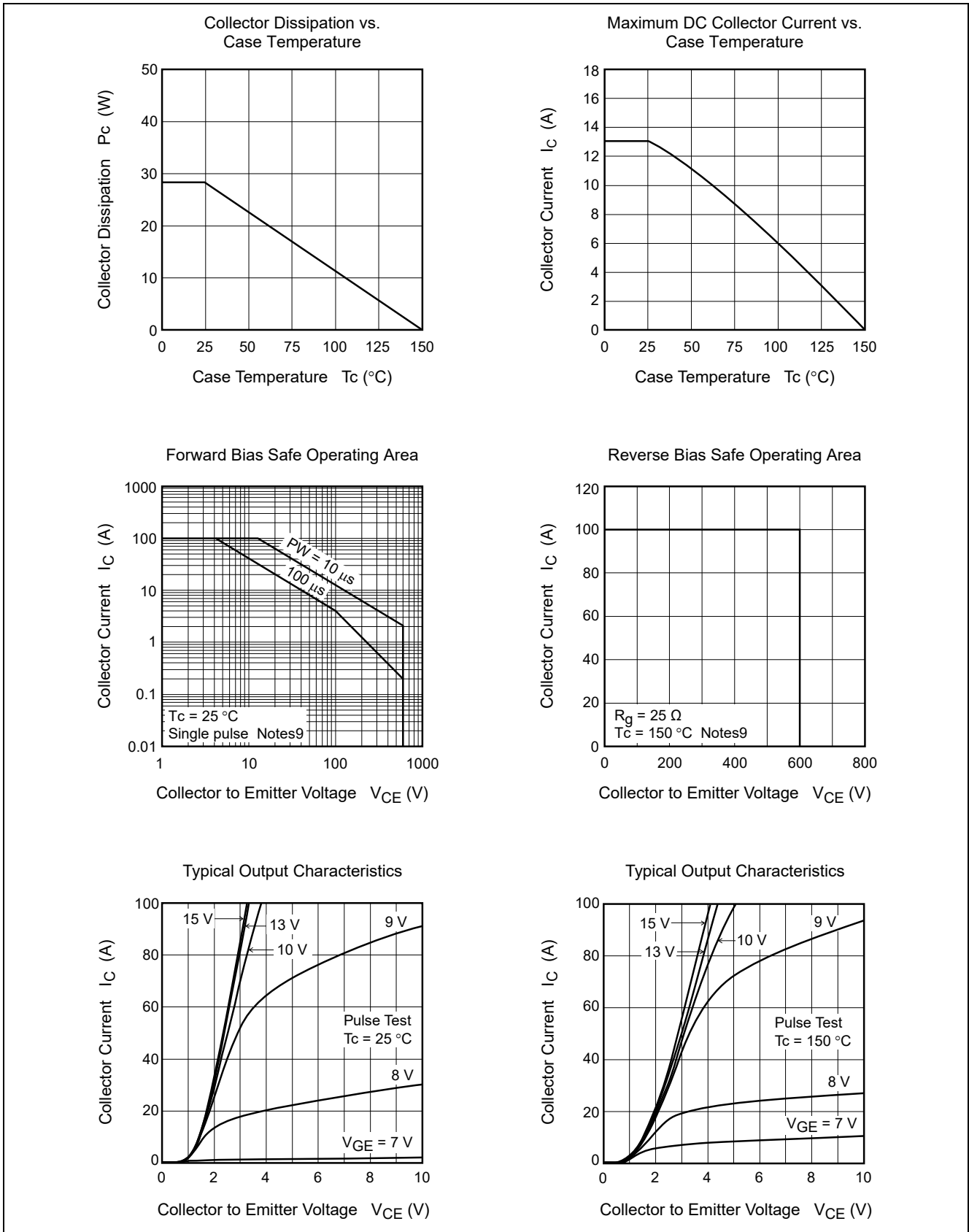
8. Switching time test circuit and waveform are shown below.

Diode

(T_c = 25 °C)

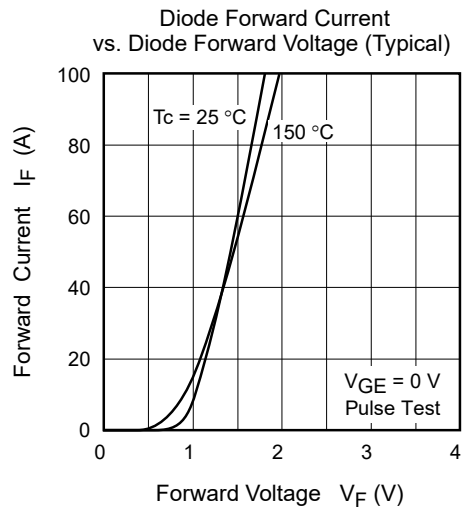
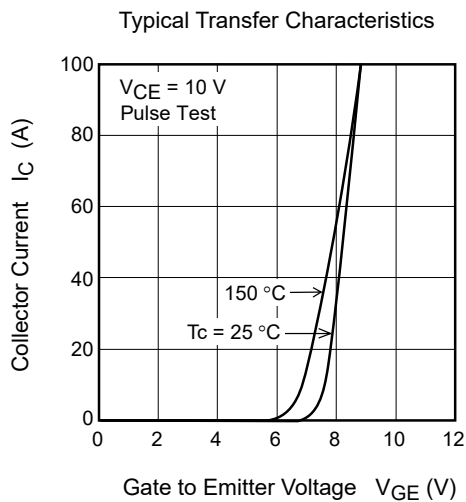
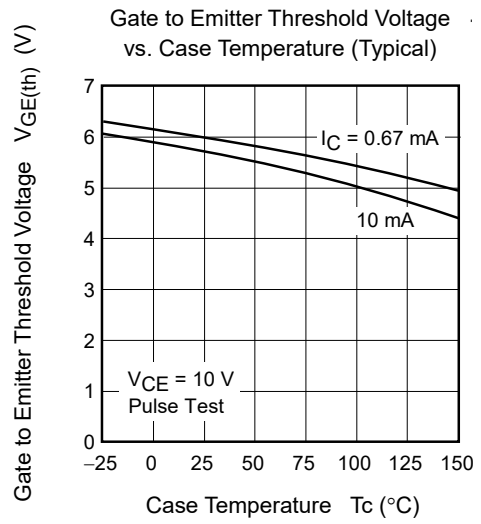
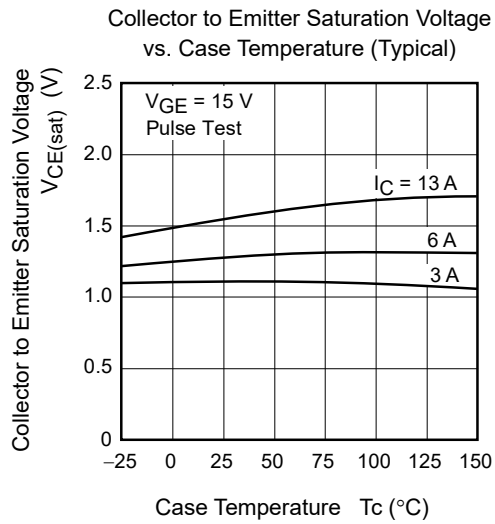
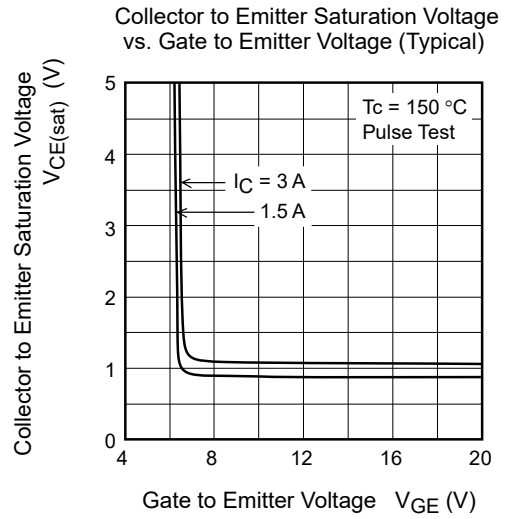
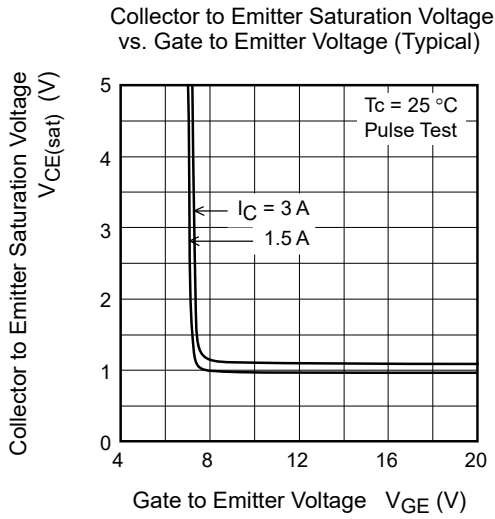
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Forward voltage	V _F	—	1.2	1.8	V	I _F = 20 A Notes6
Reverse recovery time	t _{rr}	—	100	—	ns	I _F = 20 A, dI _F /dt = 100 A/μs
Reverse recovery charge	Q _{rr}	—	0.3	—	μC	
Peak reverse recovery current	I _{rr}	—	5.3	—	A	

Main Characteristics

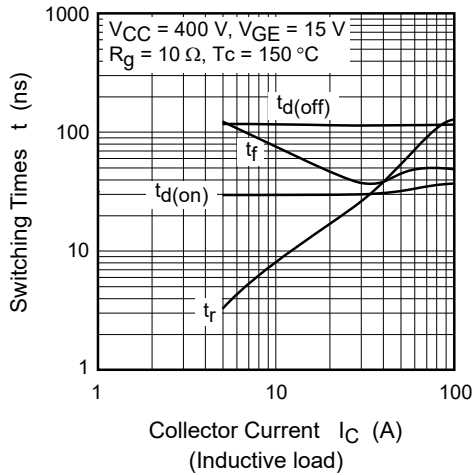


Notes: 9. Designed target value on Renesas measurement condition. (Not tested)

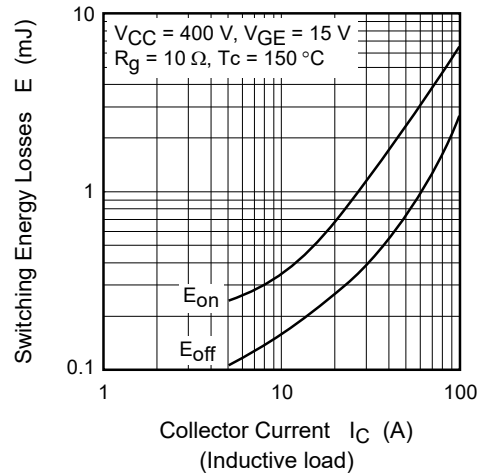
Renesas recommends that operating conditions are designed according to a document "Power MOS FET · IGBT Attention of Handling Semiconductor Devices".



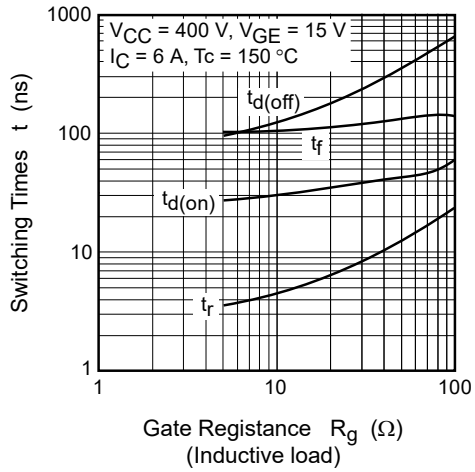
Switching Characteristics (Typical) (1)



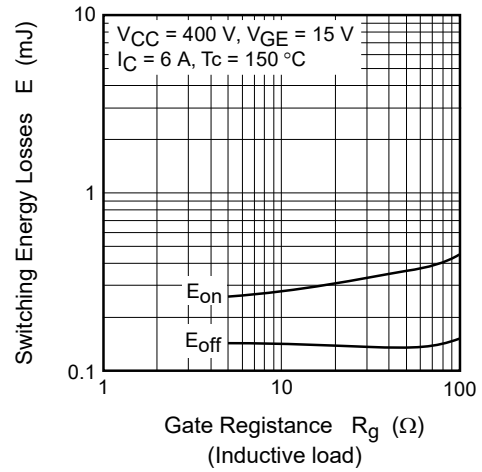
Switching Characteristics (Typical) (2)



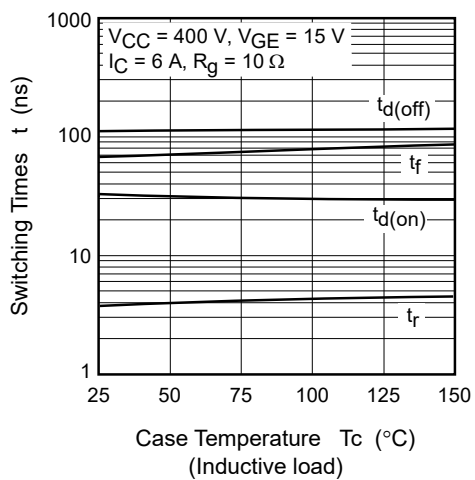
Switching Characteristics (Typical) (3)



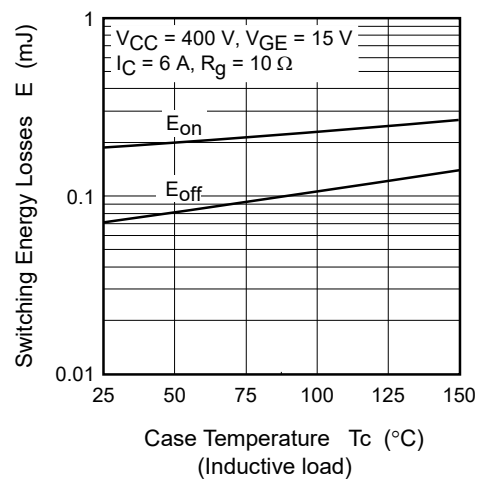
Switching Characteristics (Typical) (4)

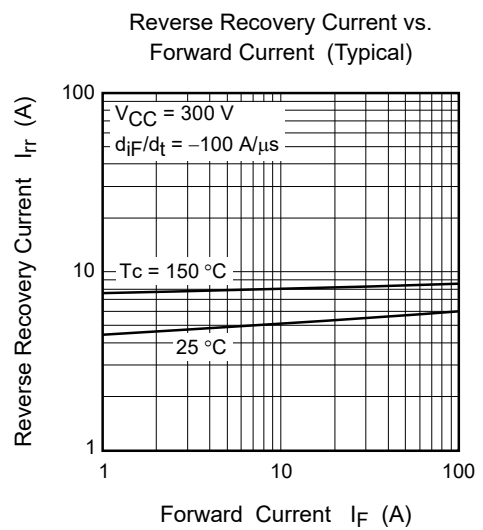
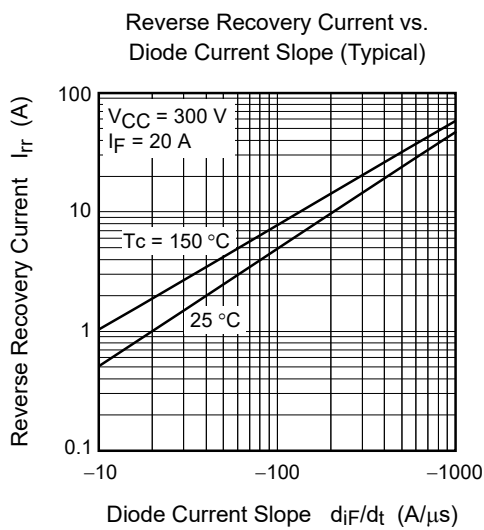
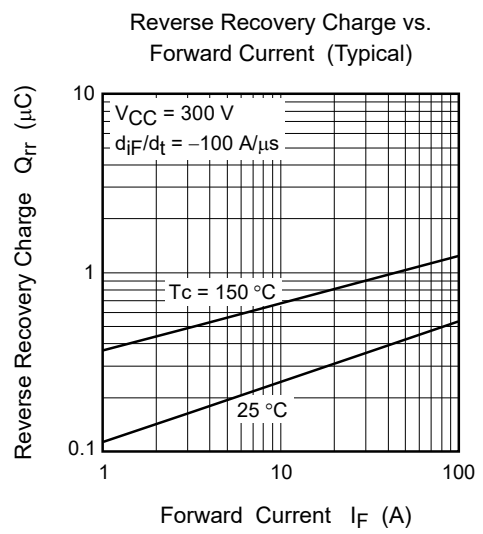
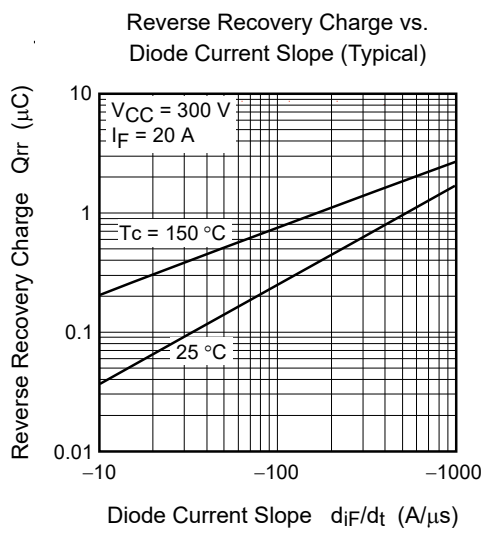
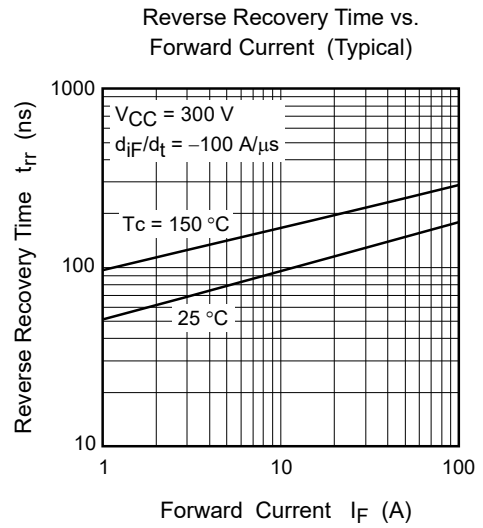
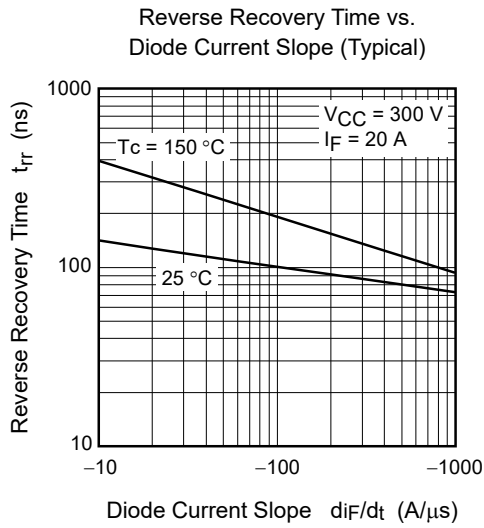


Switching Characteristics (Typical) (5)

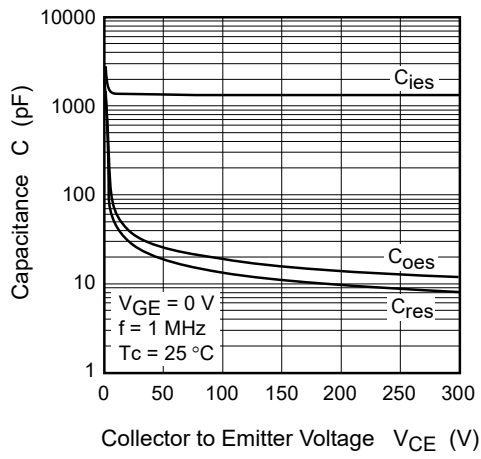


Switching Characteristics (Typical) (6)

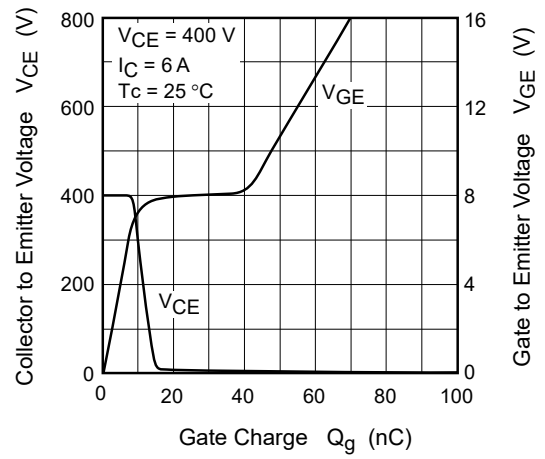


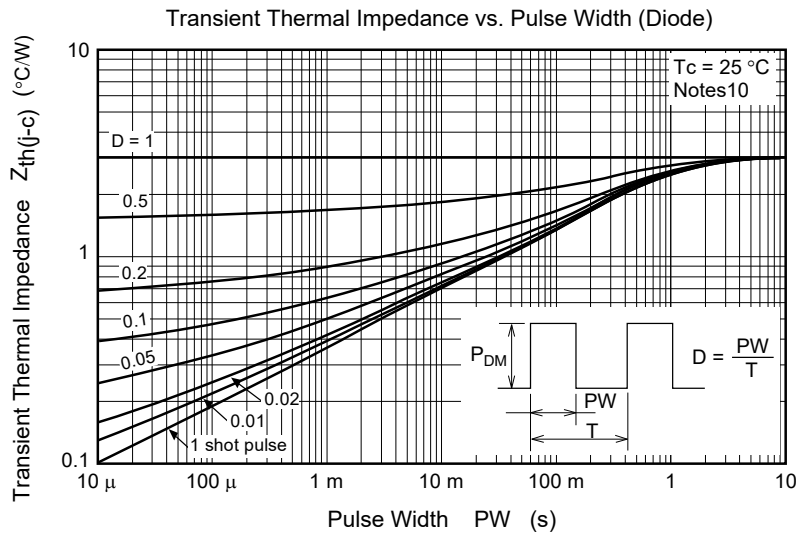
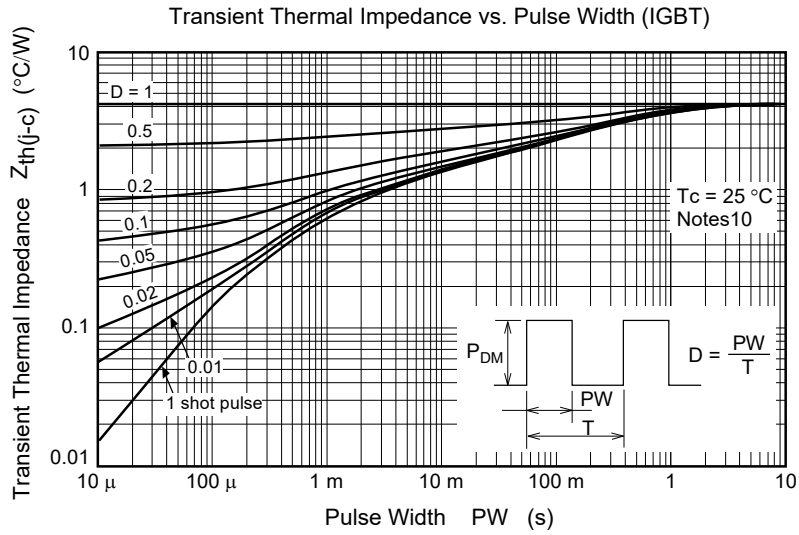


Typical Capacitance vs. Collector to Emitter Voltage



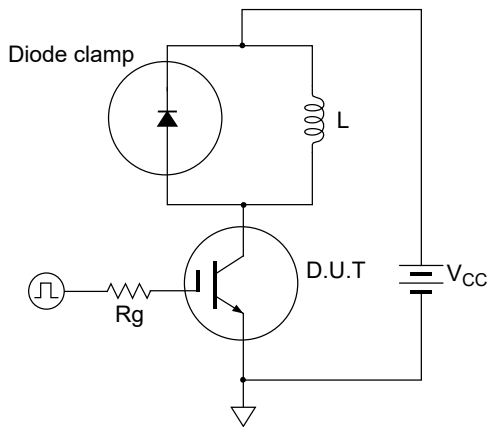
Dynamic Input Characteristics (Typical)



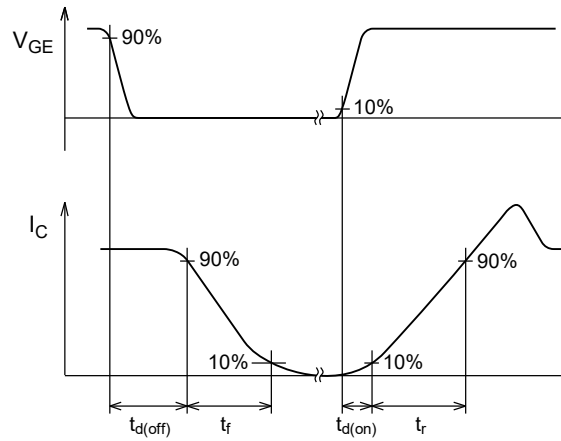


Notes: 10. Designed target value on Renesas measurement condition. (Not tested)

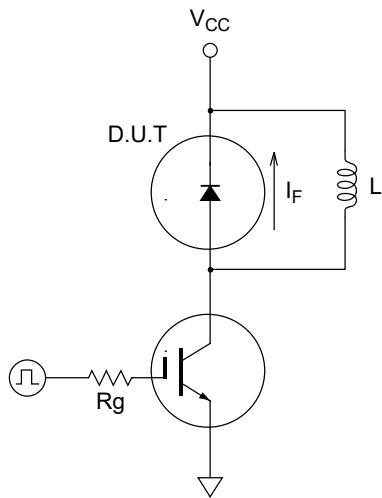
Switching Time Test Circuit



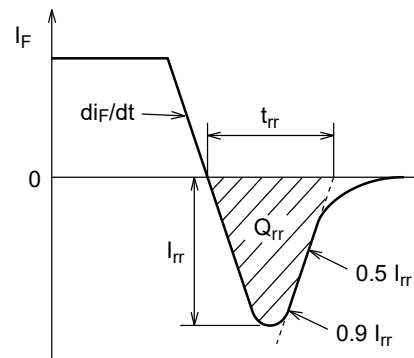
Waveform



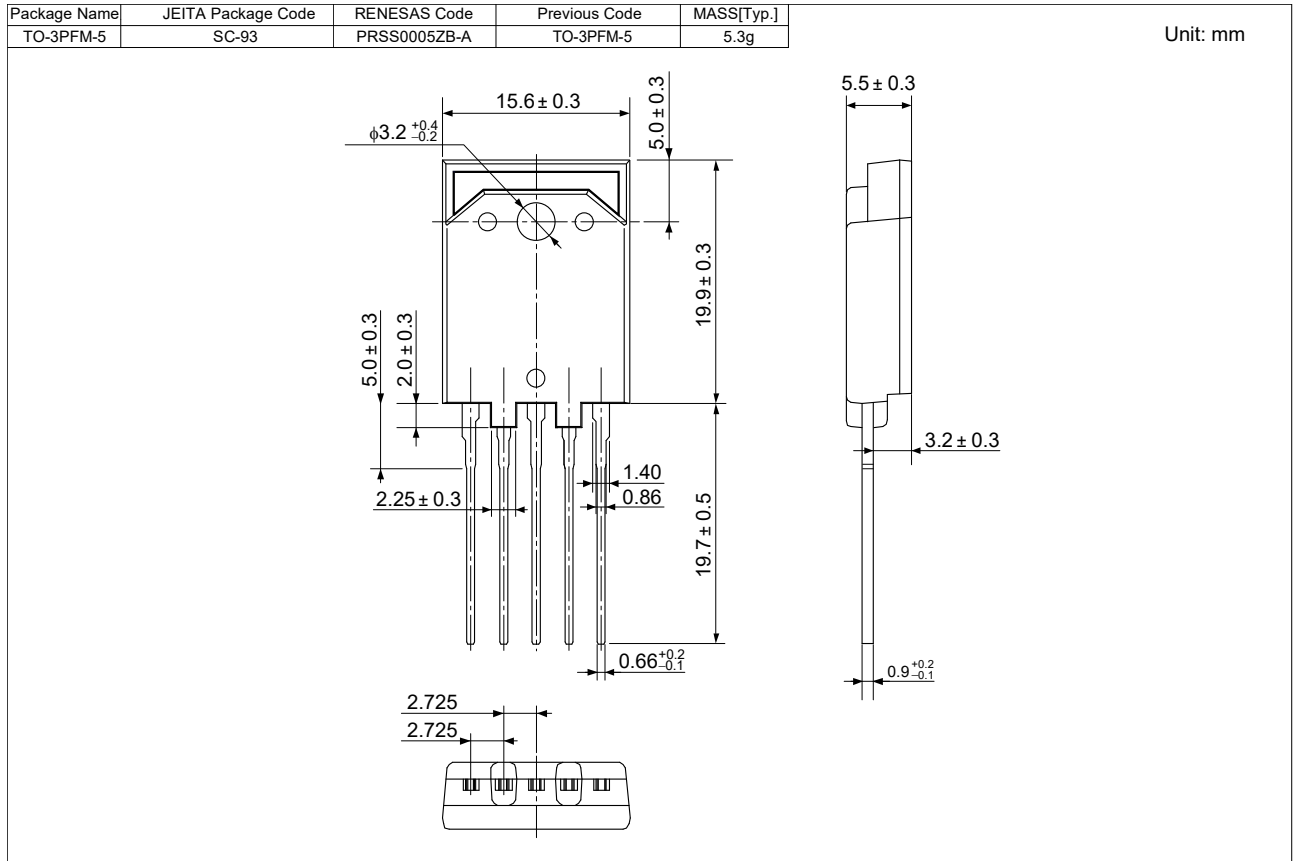
Diode Reverse Recovery Time Test Circuit



Waveform



Package Dimensions



Ordering Information

Orderable Part No.	Quantity	Shipping Container
RJQ6008BDPM-00#T0	360 pcs	Box (Tube)

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