

RJQ6015DPM

600V - 18A - IGBT and Diode

Application: Inverter

R07DS0848EJ0100

Rev.1.00

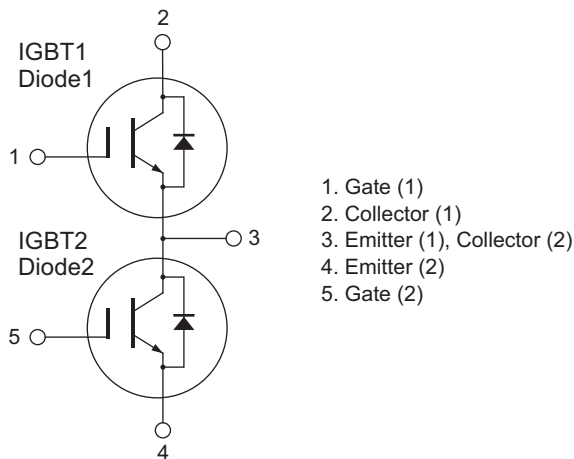
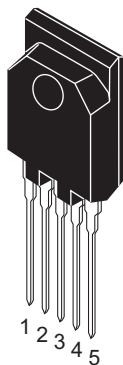
Jul 27, 2012

Features

- Short circuit withstand time (5 μ s typ.)
- Low collector to emitter saturation voltage
 $V_{CE(sat)} = 1.6$ V typ. (at $I_C = 37$ 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
 $t_f = 40$ ns typ. (at $V_{CC} = 300$ V, $V_{GE} = 15$ V, $I_C = 37$ A, $R_g = 5$ Ω , $T_a = 25^\circ\text{C}$, inductive load)

Outline

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



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 ^{Note1}	37	A
	$T_c = 100^\circ\text{C}$	I_C ^{Note1}	18	A
Collector peak current		$I_{C(peak)}$ ^{Note3}	150	A
Collector to emitter diode forward current		I_{DF} ^{Note1}	20	A
Collector to emitter diode forward peak current		$I_{DF(peak)}$ ^{Note3}	150	A
Collector dissipation		P_C ^{Note2}	50	W
Junction to case thermal resistance (IGBT)		θ_{j-c}	2.5	$^\circ\text{C/W}$
Junction to case thermal resistance (Diode)		θ_{j-cd}	4.5	$^\circ\text{C/W}$
Junction temperature		T_j	150	$^\circ\text{C}$
Storage temperature		T_{stg}	-55 to +150	$^\circ\text{C}$

- Notes: 1. Limited by T_j max.
2. Value at $T_c = 25^\circ\text{C}$
3. Pulse width limited by maximum safe operating area.

Electrical Characteristics

IGBT1, IGBT2

(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to emitter breakdown voltage/Diode reverse voltage	$V_{BR(CES)}/V_R$	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	$I_C = 37 A, V_{GE} = 15 V$ ^{Note4}
	$V_{CE(sat)}$	—	2.0	—	V	$I_C = 75 A, V_{GE} = 15 V$ ^{Note4}
Input capacitance	C_{ies}	—	1900	—	pF	$V_{CE} = 25 V$
Output capacitance	C_{oes}	—	120	—	pF	$V_{GE} = 0$
Reveres transfer capacitance	C_{res}	—	50	—	pF	$f = 1 MHz$
Total gate charge	Q_g	—	78	—	nC	$V_{GE} = 15 V$
Gate to emitter charge	Q_{ge}	—	12	—	nC	$V_{CE} = 300 V$
Gate to collector charge	Q_{gc}	—	32	—	nC	$I_C = 37 A$
Turn-on delay time	$t_{d(on)}$	—	50	—	ns	$V_{CC} = 300 V$
Rise time	t_r	—	40	—	ns	$V_{GE} = 15 V$
Turn-off delay time	$t_{d(off)}$	—	135	—	ns	$I_C = 37 A$
Fall time	t_f	—	40	—	ns	$R_g = 5 \Omega$
Turn-on energy	E_{on}	—	0.65	—	mJ	Inductive load
Turn-off energy	E_{off}	—	0.4	—	mJ	
Total switching energy	E_{total}	—	1.05	—	mJ	
Short circuit withstand time	t_{sc}	3.0	5.0	—	μs	$V_{CC} \leq 360 V, V_{GE} = 15 V$

Notes: 4. Pulse test

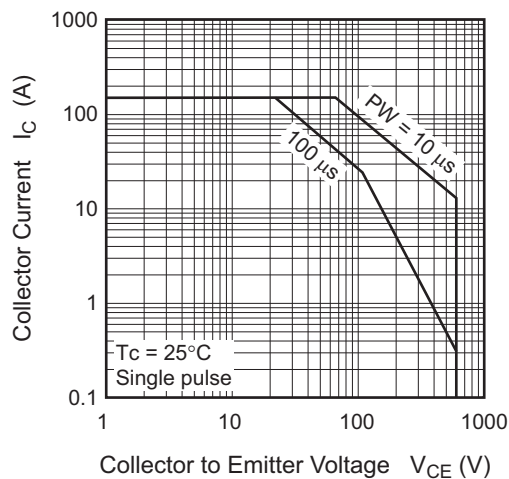
Diode1, Diode2

(Ta = 25°C)

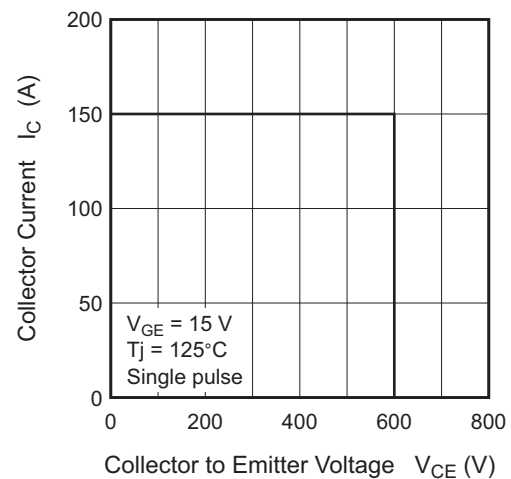
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Forward voltage	V_F	—	1.4	1.9	V	$I_F = 30 A$
Reverse current	I_R	—	—	1	μA	$V_R = 600 V$
Reverse recovery Time	t_{rr}	—	100	—	ns	$I_F = 30 A$
FRD reverse recovery charge	Q_{rr}	—	0.18	—	μC	$di/dt = 100 A/\mu s$
FRD peak reverse recovery current	I_{rr}	—	4.2	—	A	

Main Characteristics

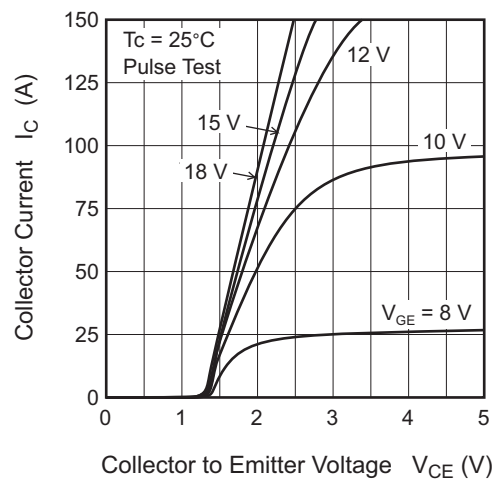
Maximum Safe Operation Area



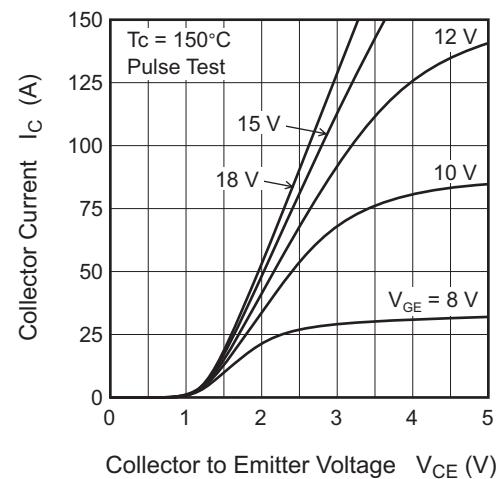
Turn-off SOA



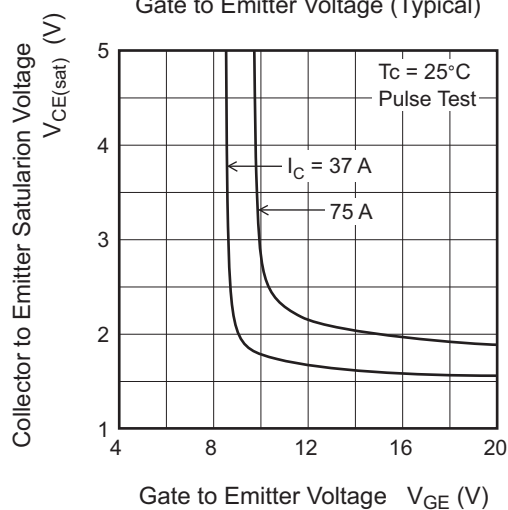
Typical Output Characteristics



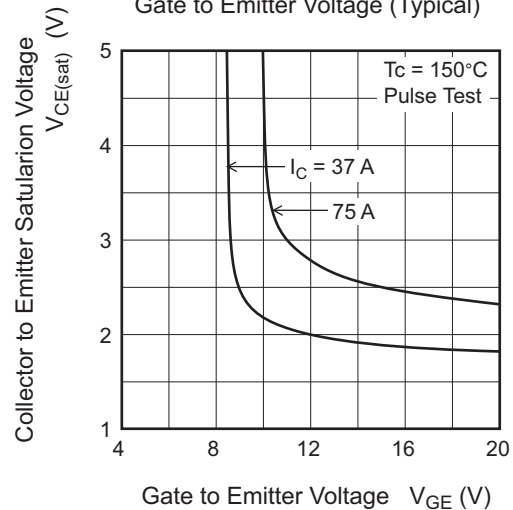
Typical Output Characteristics



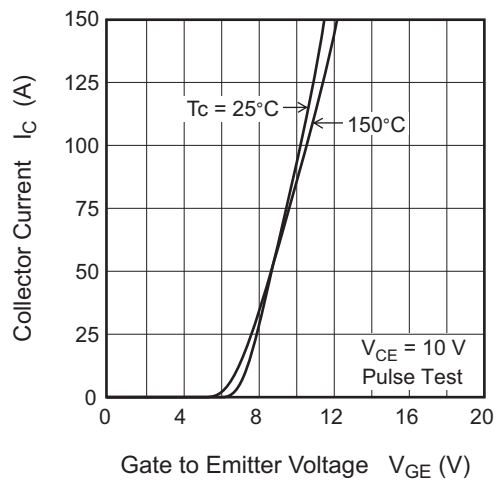
Collector to Emitter Saturation Voltage vs. Gate to Emitter Voltage (Typical)



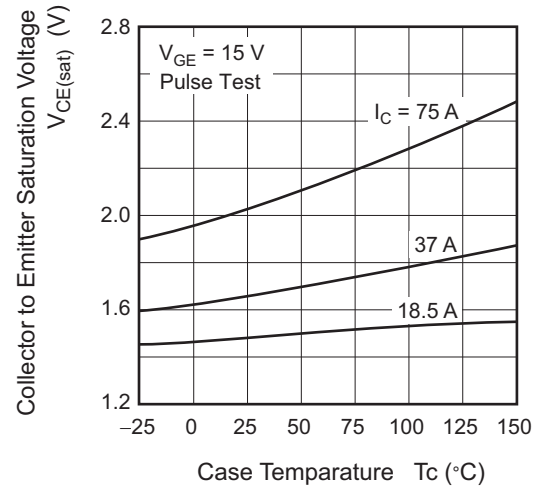
Collector to Emitter Saturation Voltage vs. Gate to Emitter Voltage (Typical)



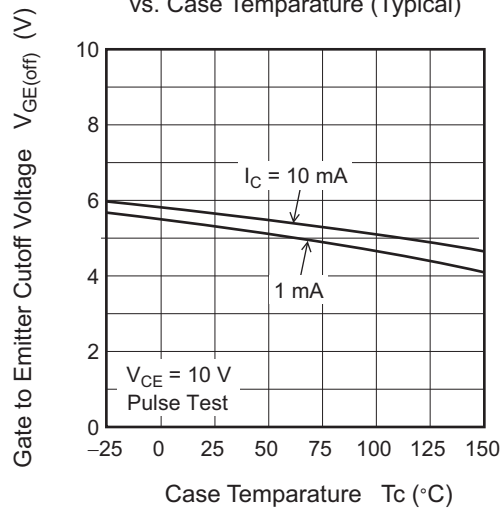
Transfer Characteristics (Typical)



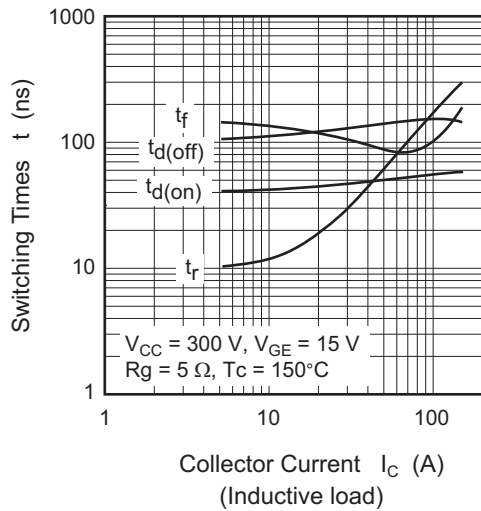
Collector to Emitter Saturation Voltage vs. Case Temperature (Typical)



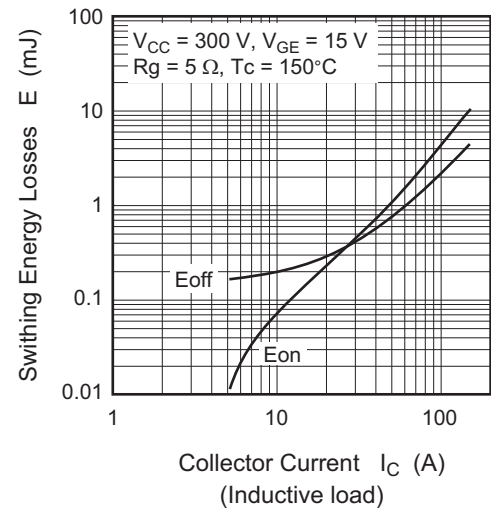
Gate to Emitter Cutoff Voltage vs. Case Temperature (Typical)



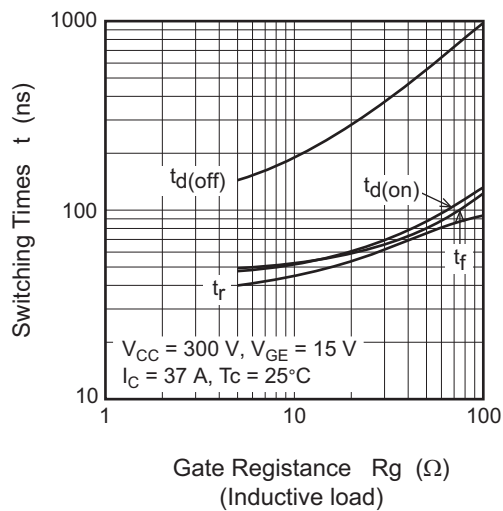
Switching Characteristics (Typical) (1)



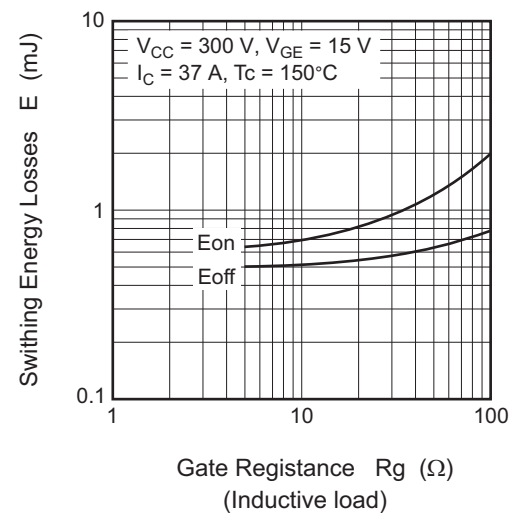
Switching Characteristics (Typical) (2)



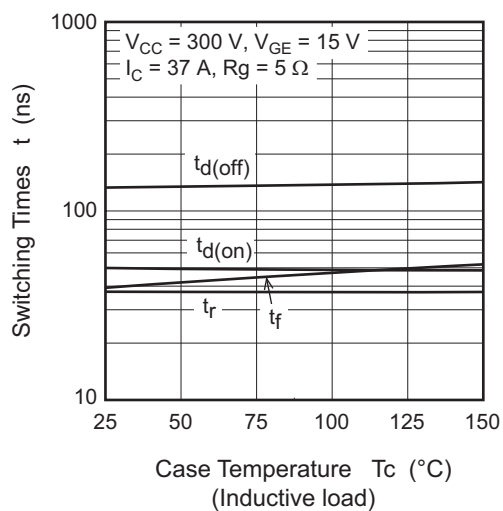
Switching Characteristics (Typical) (3)



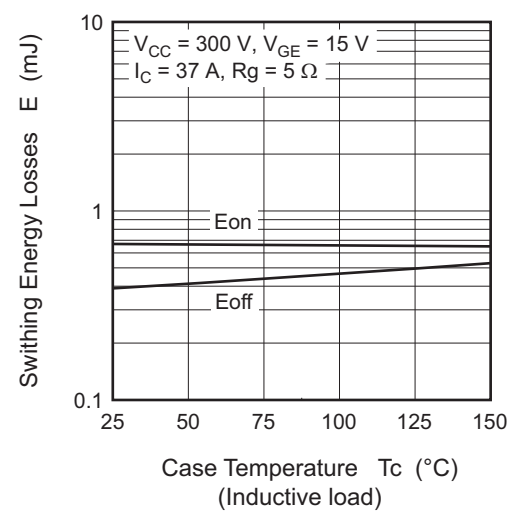
Switching Characteristics (Typical) (4)

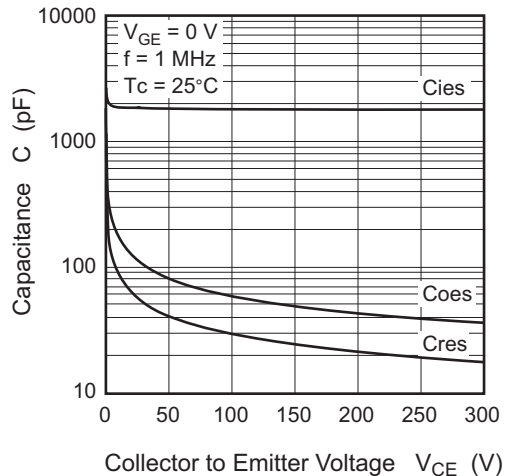


Switching Characteristics (Typical) (5)

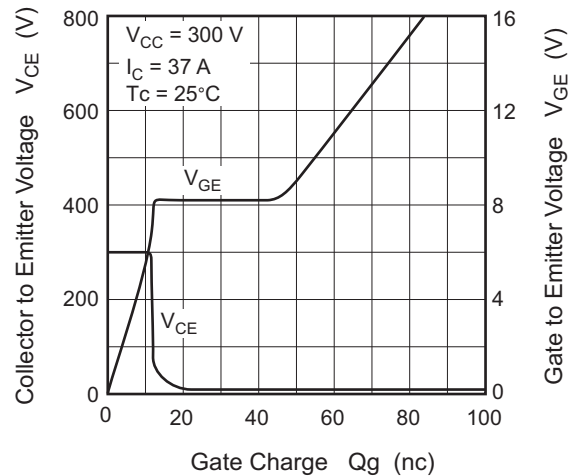
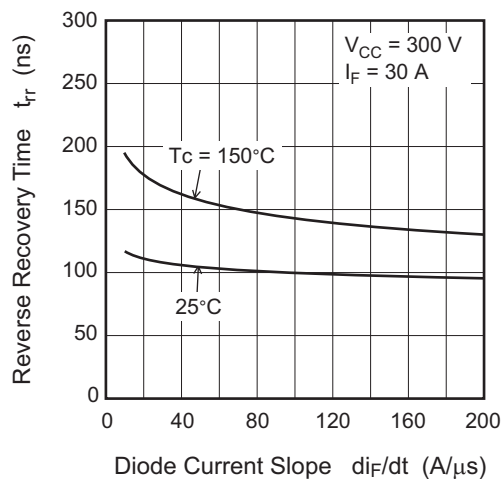
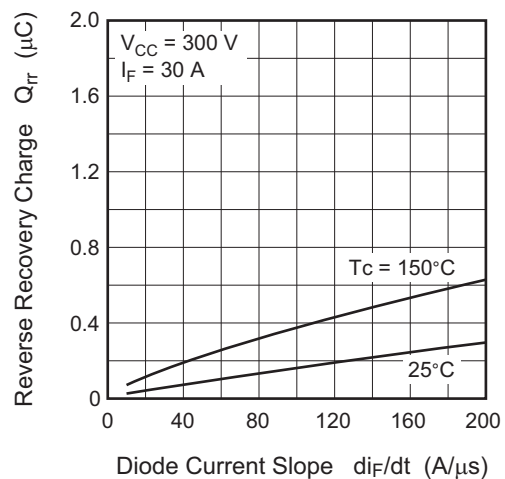
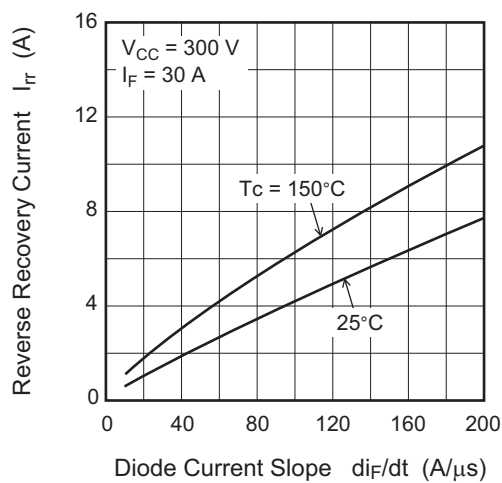


Switching Characteristics (Typical) (6)

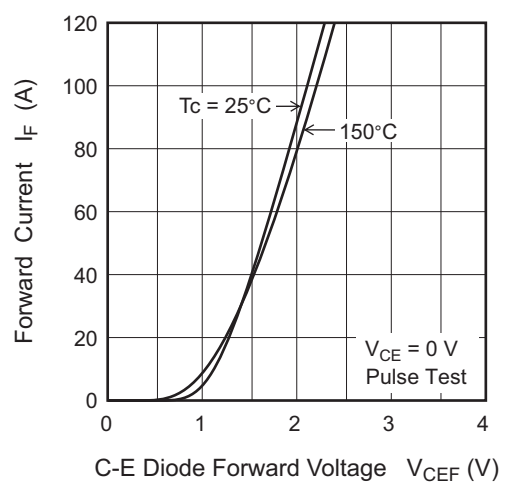


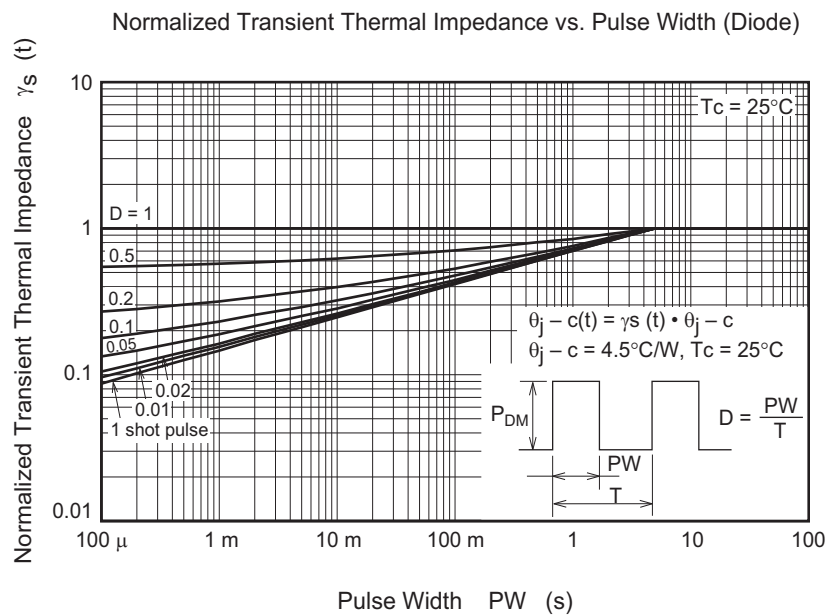
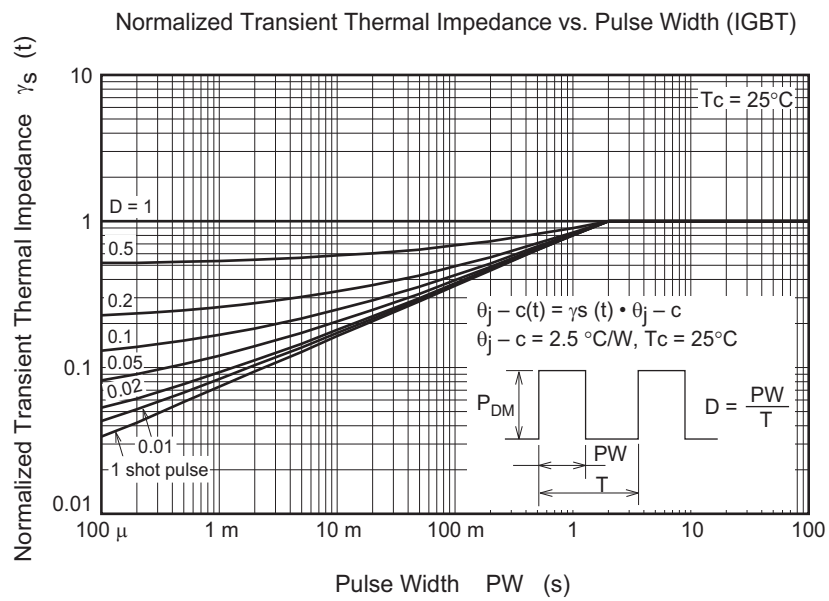
Typical Capacitance vs.
Collector to Emitter Voltage

Dynamic Input Characteristics (Typical)

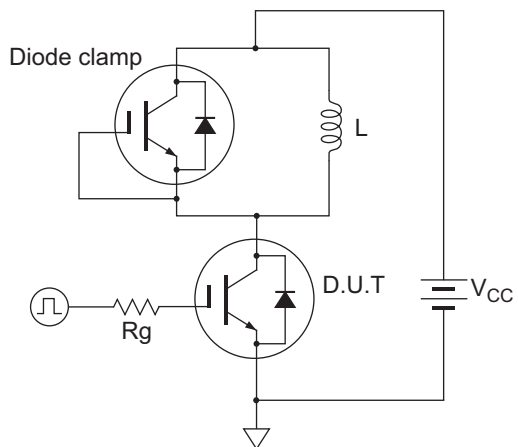
Reverse Recovery Time vs.
Diode Current Slope (Typical)Reverse Recovery Charge vs.
Diode Current Slope (Typical)Reverse Recovery Current vs.
Diode Current Slope (Typical)

Forward Current vs. Forward Voltage (Typical)

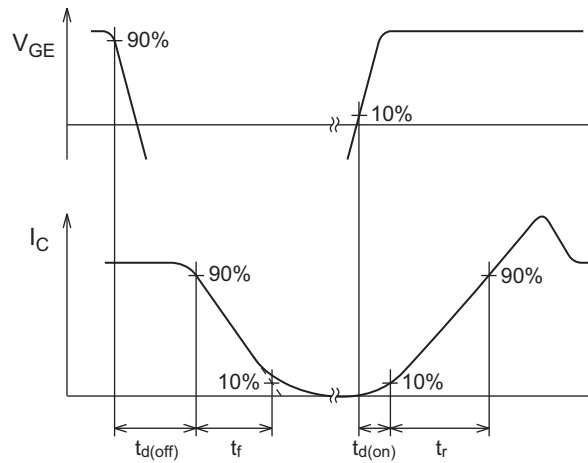




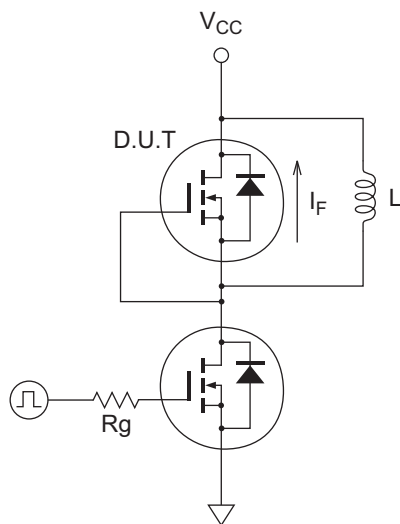
Switching Time Test Circuit



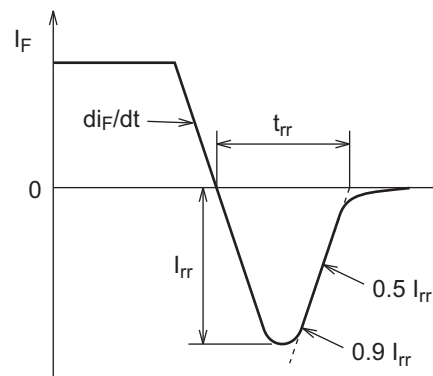
Waveform



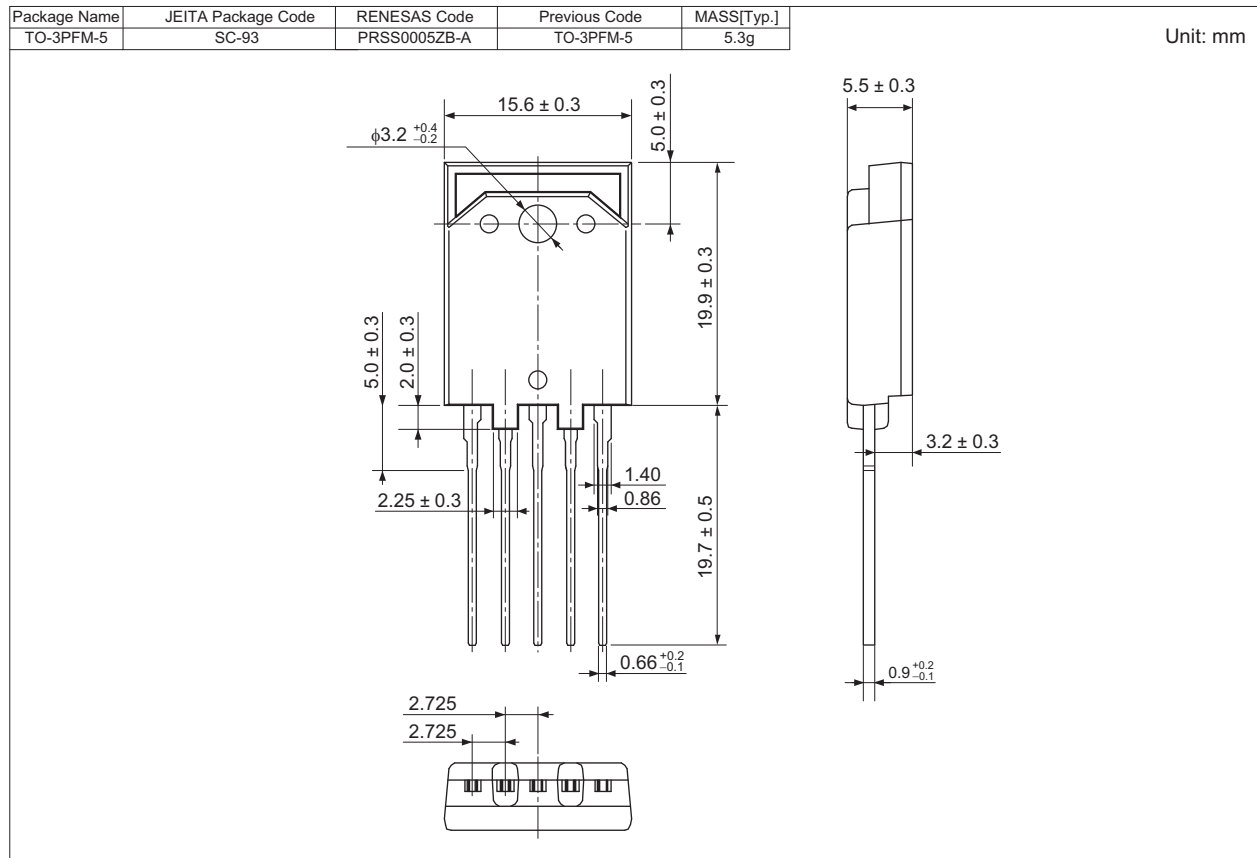
Diode Reverse Recovery Time Test Circuit



Waveform



Package Dimensions



Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJQ6015DPM-00#T0	360 pcs	Box (tube)

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