

RJQ6003DPM

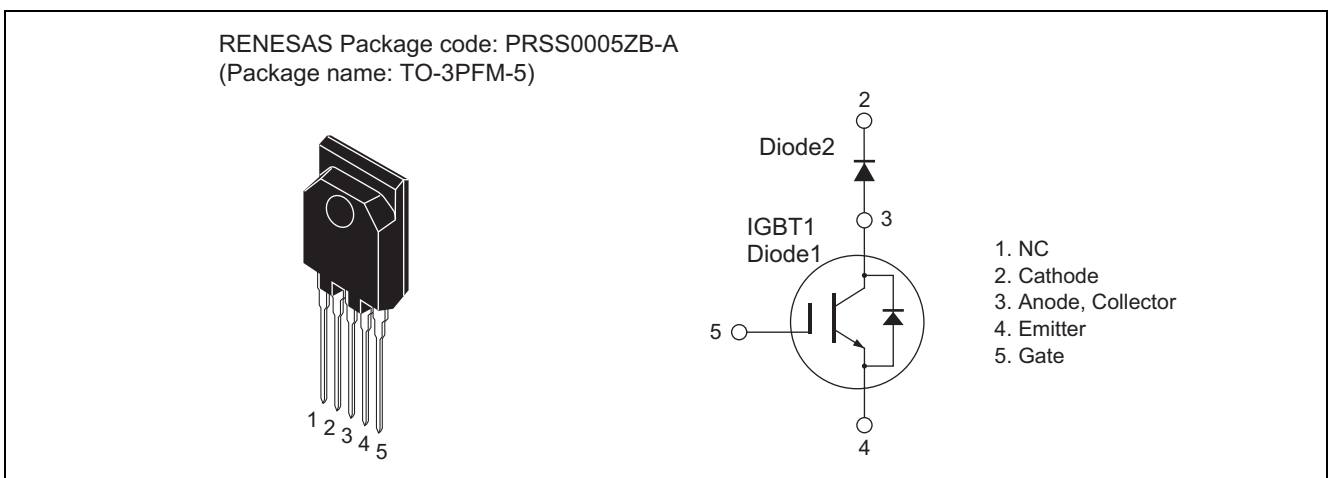
600V - 20A - IGBT and Diode
High Speed Power Switching

R07DS0846EJ0100
Rev.1.00
Aug 03, 2012

Features

- Low collector to emitter saturation voltage
 $V_{CE(sat)} = 1.37$ V typ. ($I_C = 40$ A, $V_{GE} = 15$ V, $T_a = 25^\circ\text{C}$)
- Built in fast recovery diode in one package
- Trench gate and thin wafer technology
- High speed switching
 $t_r = 85$ ns typ. (at $I_C = 30$ A, $V_{CE} = 400$ V, $V_{GE} = 15$ V, $R_g = 5$ Ω , $T_a = 25^\circ\text{C}$, inductive load)

Outline



Absolute Maximum Ratings

IGBT1, Diode1

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

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}	40	A
	$T_c = 100^\circ\text{C}$	I_C ^{Note1}	20	A
Collector peak current	$I_{C(peak)}$ ^{Note3}	160	A	
Collector to emitter diode forward current	I_{DF} ^{Note1}	20	A	
Collector to emitter diode forward peak current	$I_{DF(peak)}$ ^{Note3}	100	A	
Collector dissipation	P_C ^{Note2}	50	W	
Junction to case thermal impedance (IGBT)	θ_{j-c}	2.5	$^\circ\text{C}/\text{W}$	
Junction to case thermal impedance (Diode)	θ_{j-cd}	4.5	$^\circ\text{C}/\text{W}$	
Junction temperature	T_j	150	$^\circ\text{C}$	
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$	

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

Diode2

(Ta = 25°C)

Item	Symbol	Ratings	Unit
Maximum reverse voltage	V_{RM}	600	V
Continuous forward current	I_F ^{Note1}	20	A
Peak surge forward current	I_{FSM} ^{Note4}	80	A
Junction to case thermal impedance	θ_{j-c}	4.5	°C/W
Junction temperature	T_j	150	°C
Storage temperature	T_{stg}	-55 to +150	°C

Notes: 4. 50 Hz sine half wave, Non-repetitive 1 cycle value, $T_j = 25^\circ\text{C}$.

Electrical Characteristics

IGBT

(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current	I_{CES}	—	—	100	μA	$V_{CE} = 600\text{V}, V_{GE} = 0$
Gate to emitter leak current	I_{GES}	—	—	± 1	μA	$V_{GE} = \pm 30\text{V}, V_{CE} = 0$
Gate to emitter cutoff voltage	$V_{GE(off)}$	4	—	8	V	$V_{CE} = 10\text{V}, I_C = 1\text{mA}$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	1.37	1.8	V	$I_C = 40\text{A}, V_{GE} = 15\text{V}$ ^{Note5}
	$V_{CE(sat)}$	—	1.7	—	V	$I_C = 80\text{A}, V_{GE} = 15\text{V}$ ^{Note5}
Input capacitance	C_{ies}	—	2780	—	pF	$V_{CE} = 25\text{V}$
Output capacitance	C_{oes}	—	122	—	pF	$V_{GE} = 0\text{V}$
Reverse transfer capacitance	C_{res}	—	43	—	pF	$f = 1\text{MHz}$
Switching time	$t_{d(on)}$	—	53	—	ns	$I_C = 30\text{A},$ $V_{CE} = 400\text{V}, V_{GE} = 15\text{V}$ $R_g = 5\ \Omega$ ^{Note5} Inductive load
	t_r	—	145	—	ns	
	$t_{d(off)}$	—	105	—	ns	
	t_f	—	85	—	ns	

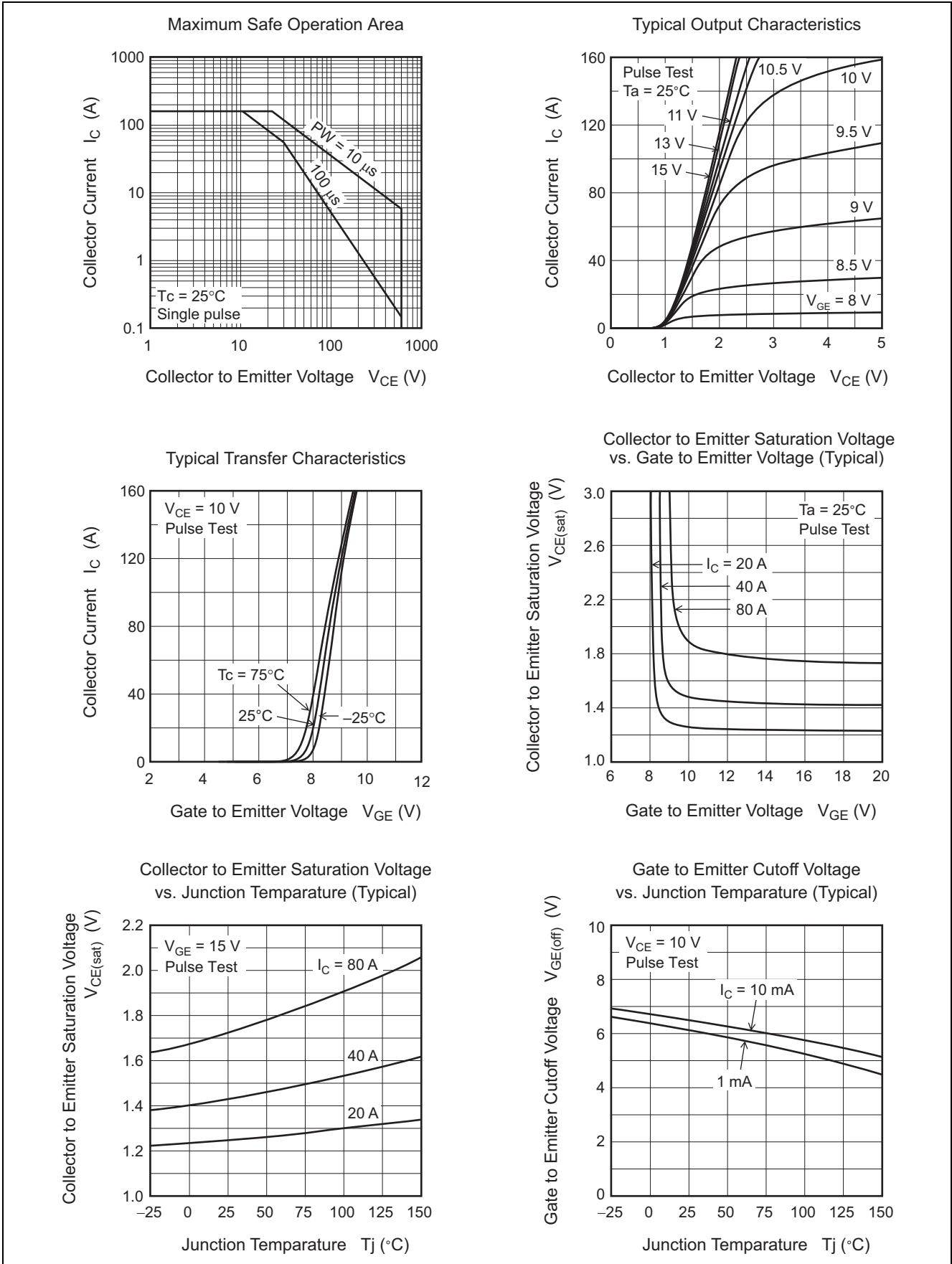
Notes: 5. Pulse test

Diode1, Diode2

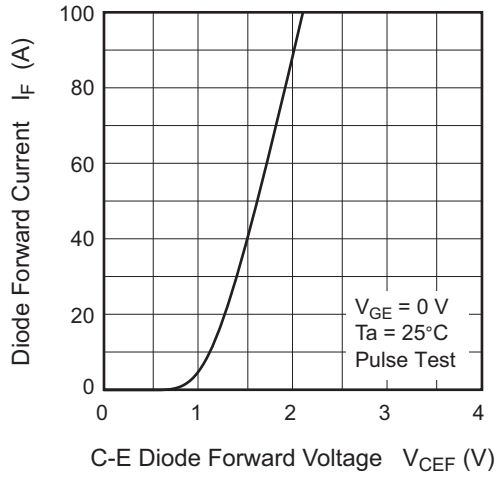
(Ta = 25°C)

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

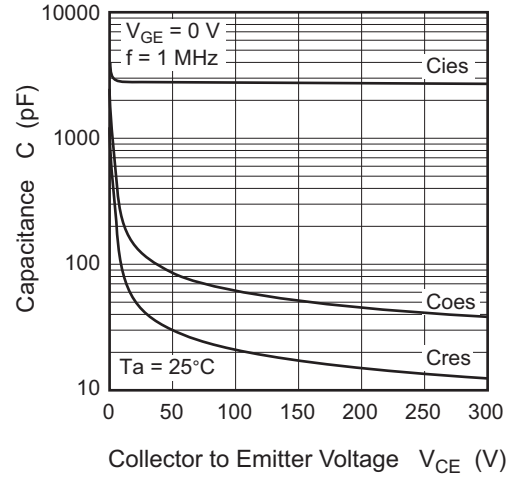
Main Characteristics



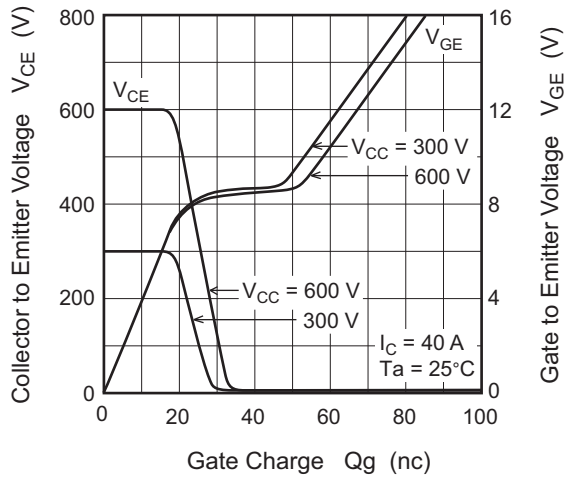
Forward Current vs. Forward Voltage (Typical)



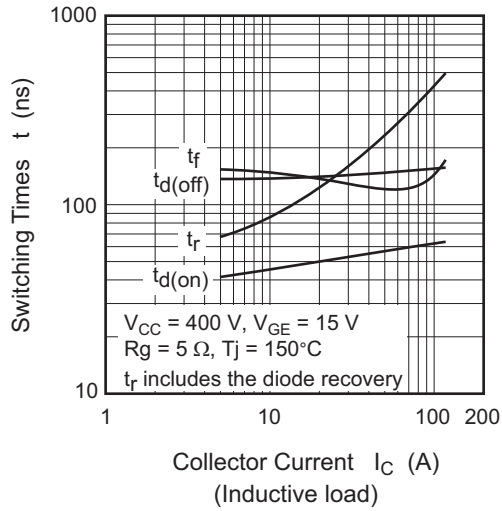
Typical Capacitance vs. Collector to Emitter Voltage



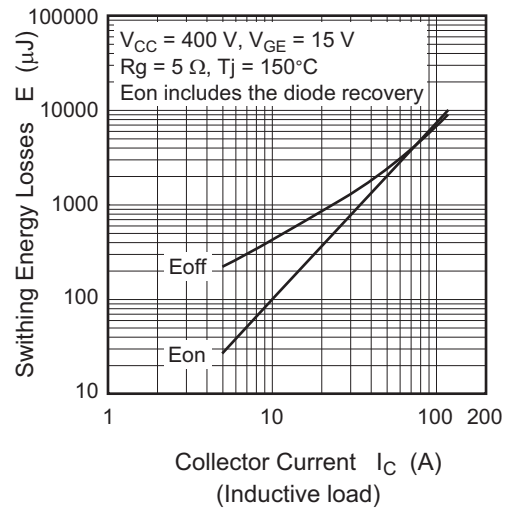
Dynamic Input Characteristics (Typical)



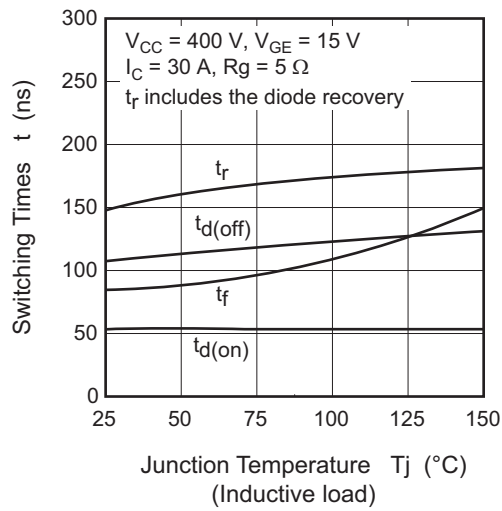
Switching Characteristics (Typical) (1)



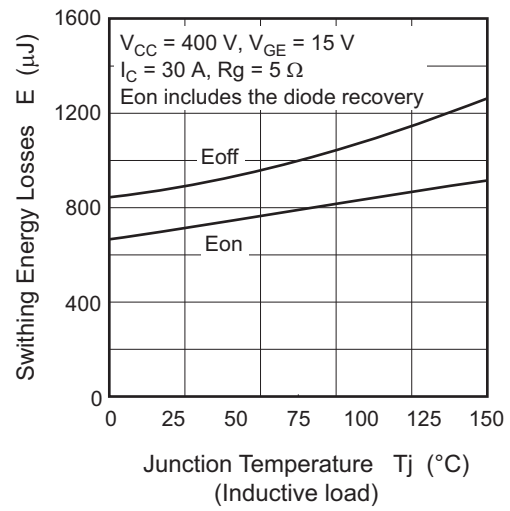
Switching Characteristics (Typical) (2)

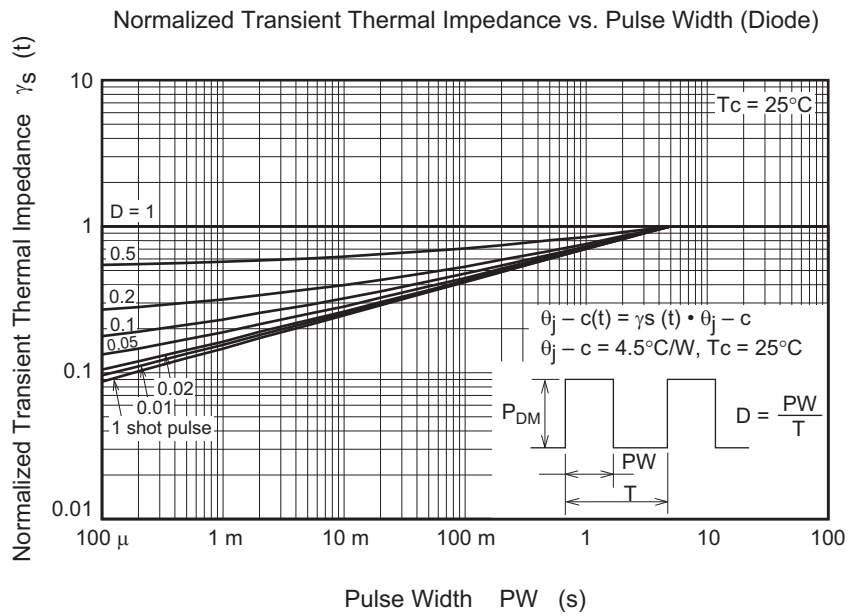
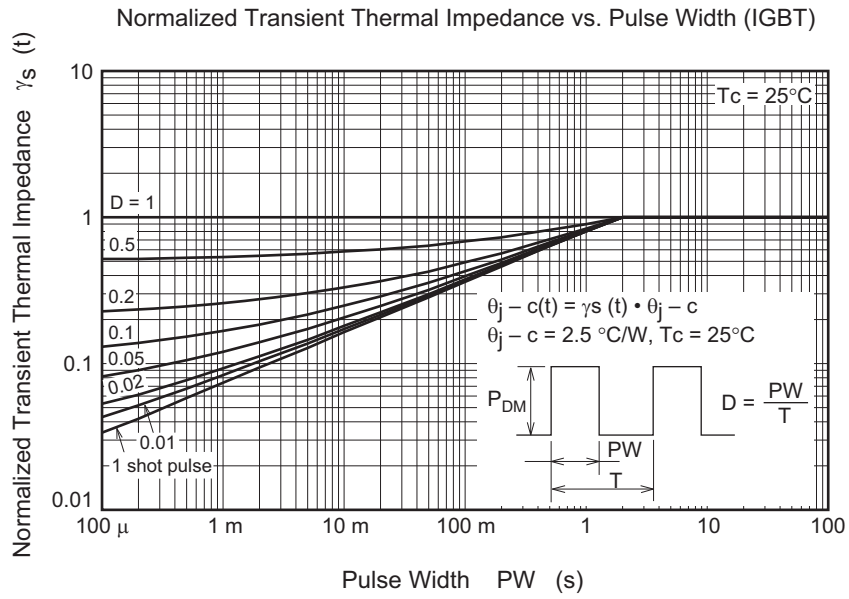


Switching Characteristics (Typical) (3)

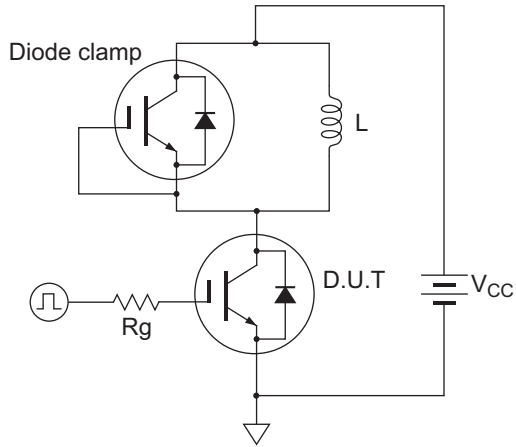


Switching Characteristics (Typical) (4)

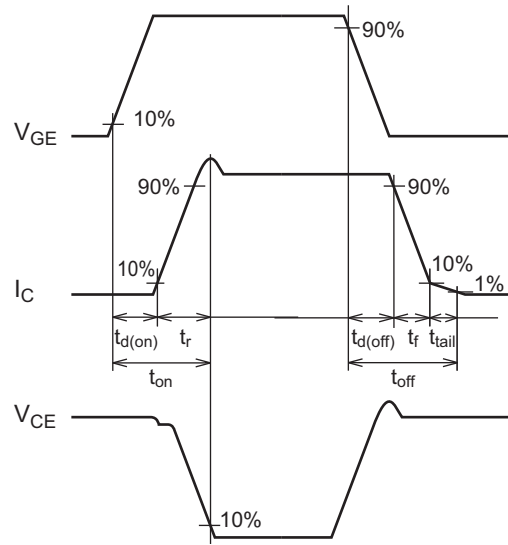




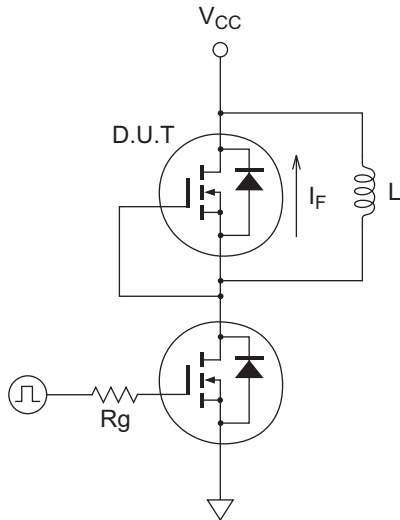
Switching Time Test Circuit



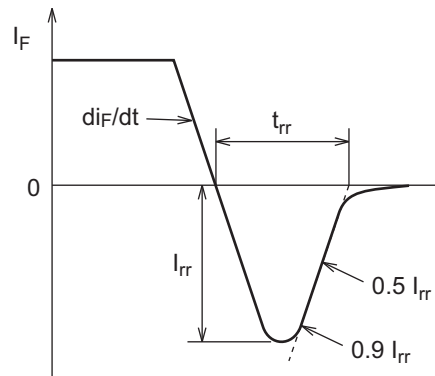
Waveform



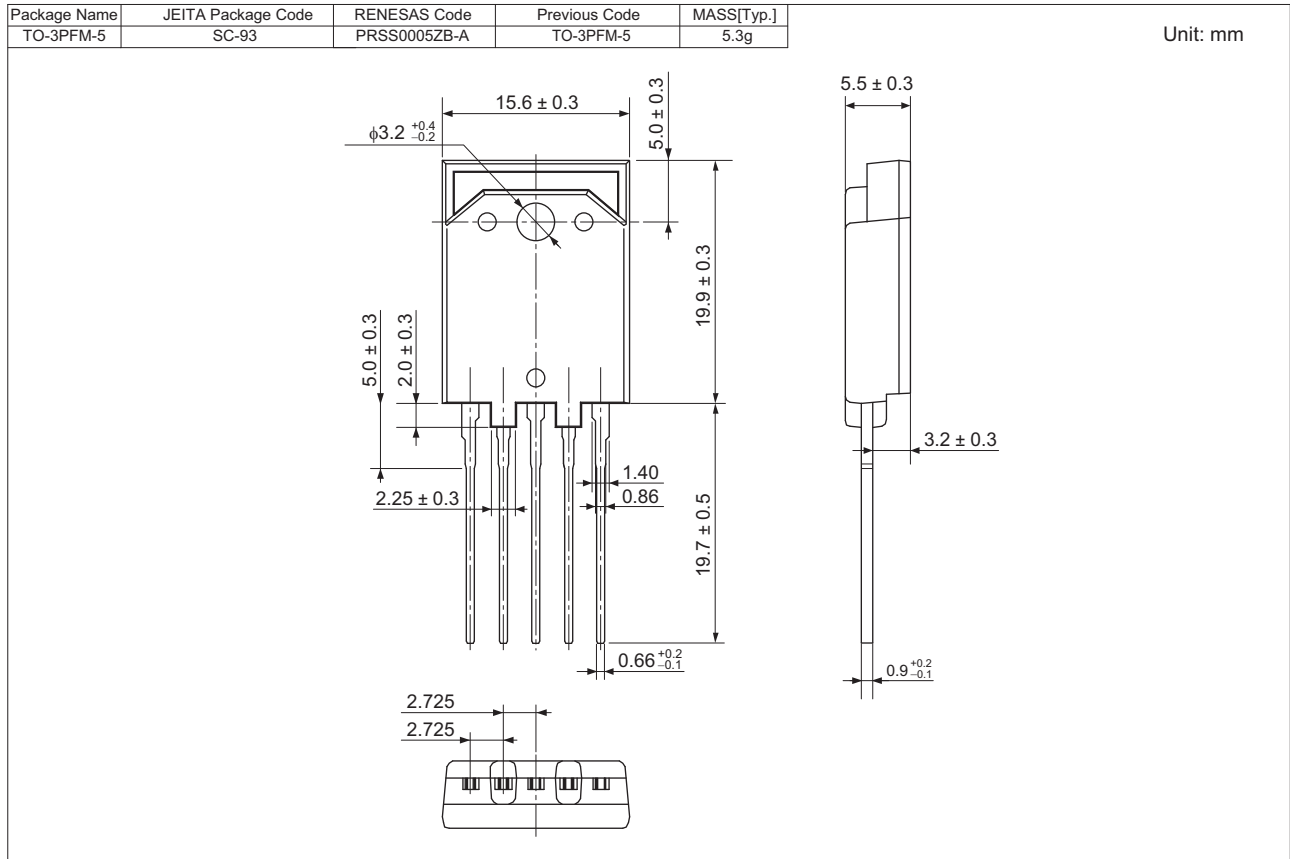
Diode Reverse Recovery Time Test Circuit



Waveform



Package Dimensions



Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJQ6003DPM-00#T0	360 pcs	Box (tube)

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