RJQ6015DPM

600V - 18A - IGBT and Diode
Application: Inverter

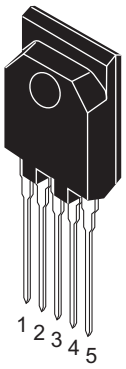
R07DS0848EJ0100
Rev.1.00
Jul 27, 2012

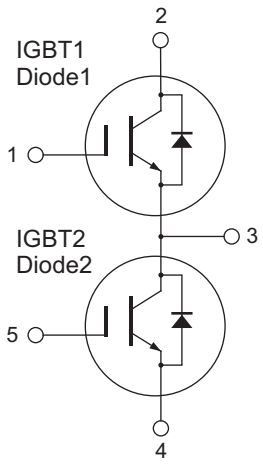
Features

- Short circuit withstand time (5 μs typ.)
- Low collector to emitter saturation voltage
  $V_{CE(sat)}$ = 1.6 V typ. (at I_C = 37 A, V_{GE} = 15 V, Ta = 25°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, Rg = 5 Ω, Ta = 25°C, inductive load)

Outline

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





1. Gate (1)
2. Collector (1)
3. Emitter (1), Collector (2)
4. Emitter (2)
5. Gate (2)

Absolute Maximum Ratings

(Ta = 25°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	Tc = 25°C	I_C Note1	37	A
	Tc = 100°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)		θj-c	2.5	°C/W
Junction to case thermal resistance (Diode)		θj-cd	4.5	°C/W
Junction temperature		Tj	150	°C
Storage temperature		Tstg	–55 to +150	°C

Notes: 1. Limited by Tj max.
2. Value at Tc = 25°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 μA, 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} = ±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	Cies	—	1900	—	pF	V_{CE} = 25 V V_{GE} = 0 f = 1 MHz
Output capacitance	Coes	—	120	—	pF	
Reveres transfer capacitance	Cres	—	50	—	pF	
Total gate charge	Qg	—	78	—	nC	V_{GE} = 15 V V_{CE} = 300 V I_C = 37 A
Gate to emitter charge	Qge	—	12	—	nC	
Gate to collector charge	Qgc	—	32	—	nC	
Turn-on delay time	$t_{d(on)}$	—	50	—	ns	V_{CC} = 300 V V_{GE} = 15 V I_C = 37 A Rg = 5 Ω Inductive load
Rise time	t_r	—	40	—	ns	
Turn-off delay time	$t_{d(off)}$	—	135	—	ns	
Fall time	t_f	—	40	—	ns	
Turn-on energy	E_{on}	—	0.65	—	mJ	
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

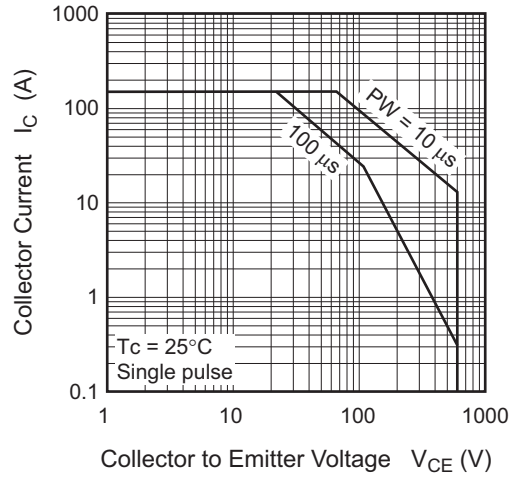
Diode1, Diode2

(Ta = 25°C)

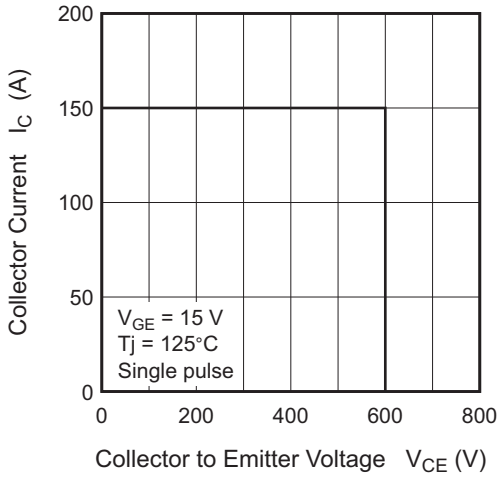
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Forward voltage	V_F	—	1.4	1.9	V	I_F = 30 A
Reverse current	I_R	—	—	1	μA	V_R = 600 V
Reverse recovery Time	t_{rr}	—	100	—	ns	I_F = 30 A di/dt = 100 A/μs
FRD reverse recovery charge	Q_{rr}	—	0.18	—	μC	
FRD peak reverse recovery current	I_{rr}	—	4.2	—	A	

Main Characteristics

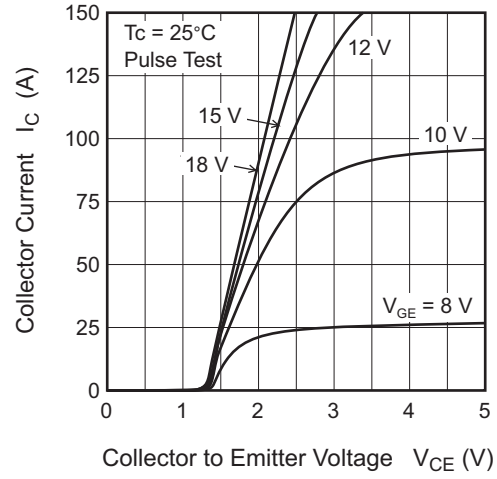
Maximum Safe Operation Area



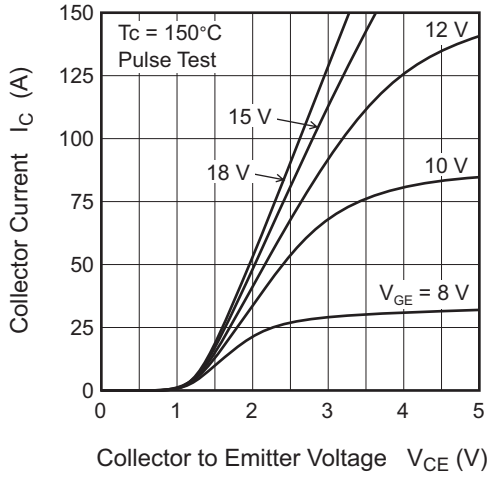
Turn-off SOA



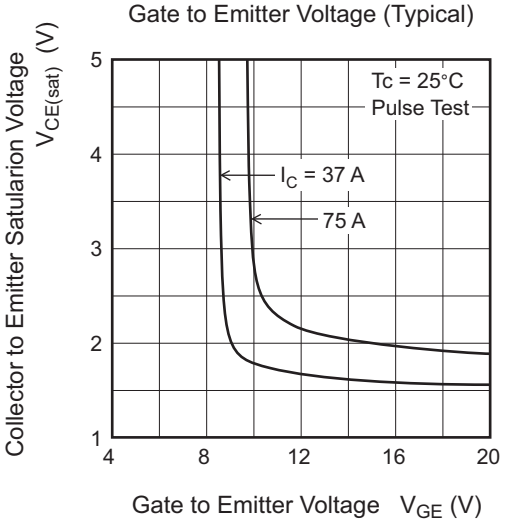
Typical Output Characteristics



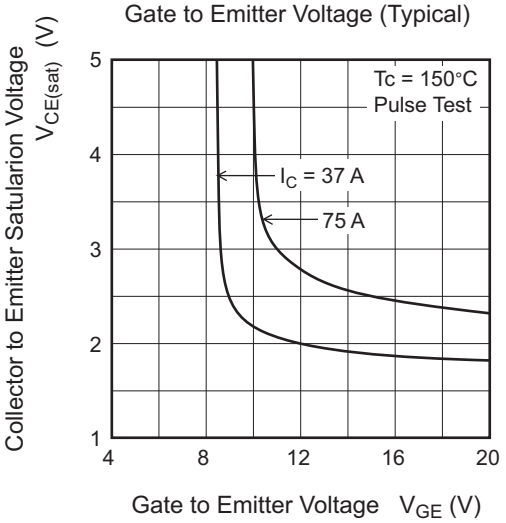
Typical Output Characteristics



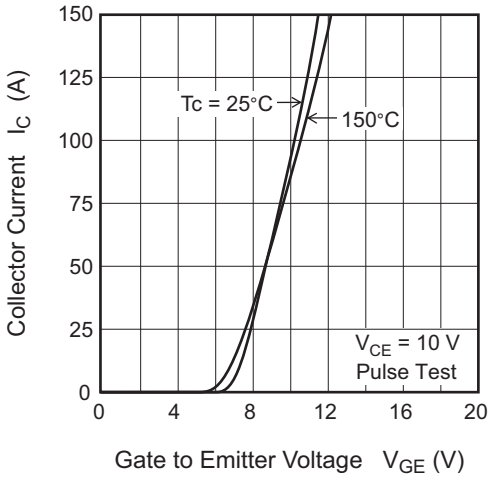
Collector to Emitter Satularion Voltage vs.
Gate to Emitter Voltage (Typical)



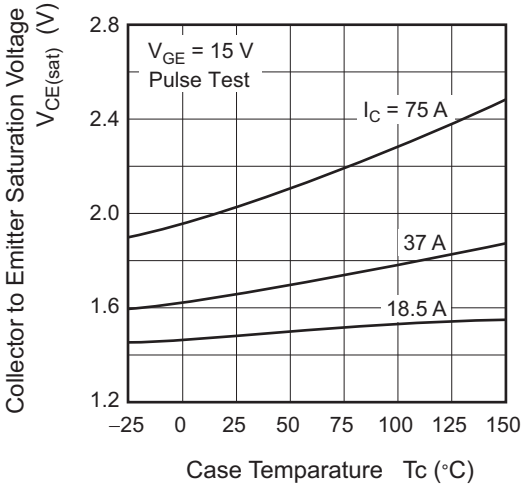
Collector to Emitter Satularion Voltage vs.
Gate to Emitter Voltage (Typical)



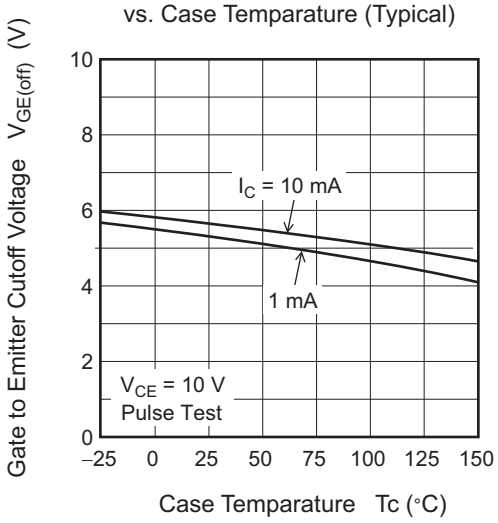
Transfer Characteristics (Typical)



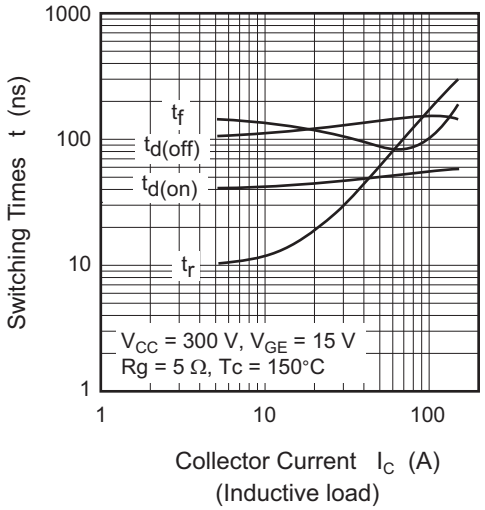
Collector to Emitter Saturation Voltage vs. Case Temparature (Typical)



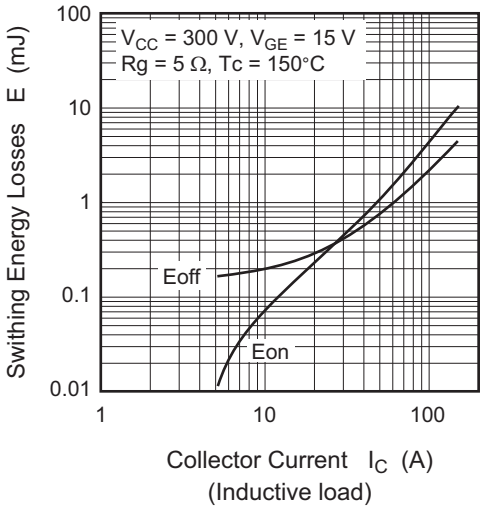
Gate to Emitter Cutoff Voltage vs. Case Temparature (Typical)



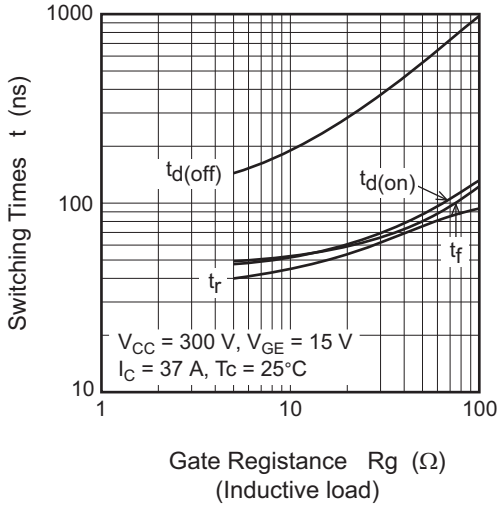
Switching Characteristics (Typical) (1)



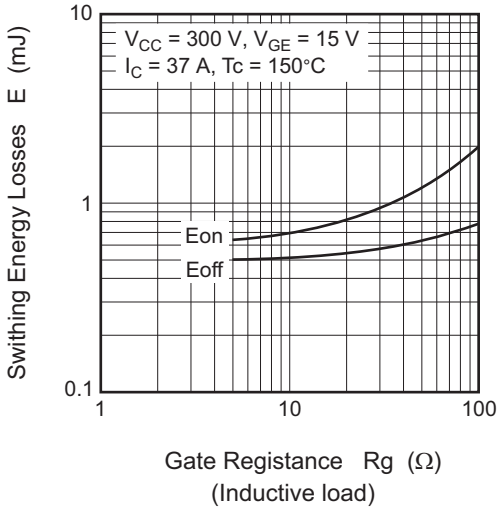
Switching Characteristics (Typical) (2)



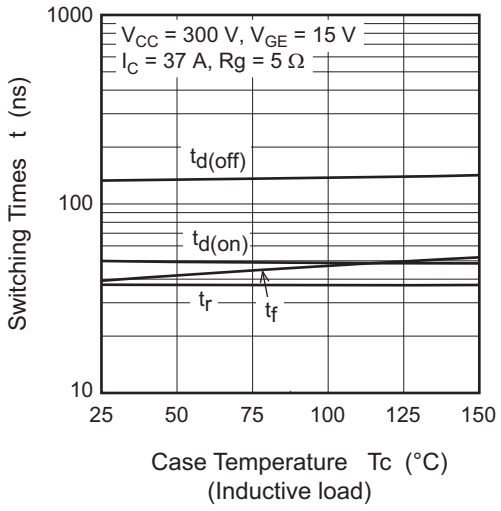
Switching Characteristics (Typical) (3)



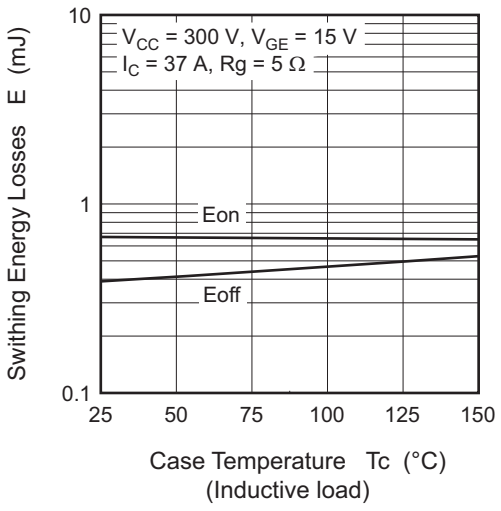
Switching Characteristics (Typical) (4)



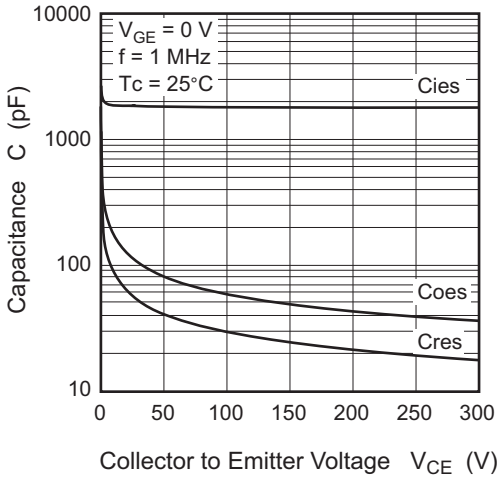
Switching Characteristics (Typical) (5)



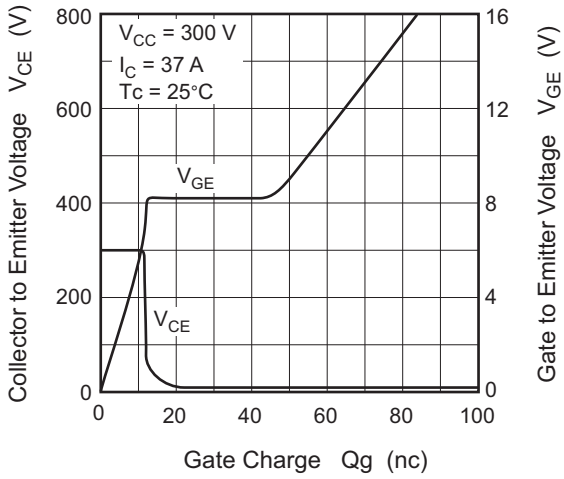
Switching Characteristics (Typical) (6)



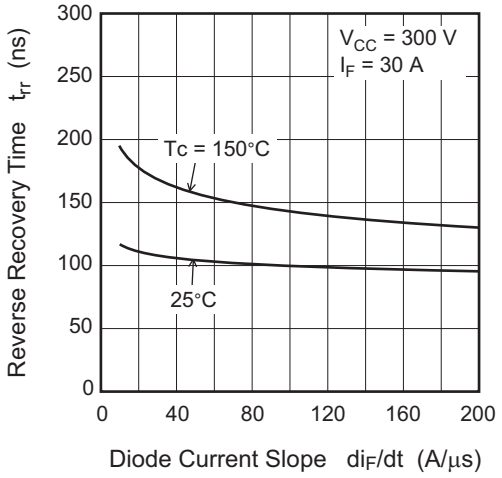
Typical Capacitance vs. Collector to Emitter Voltage



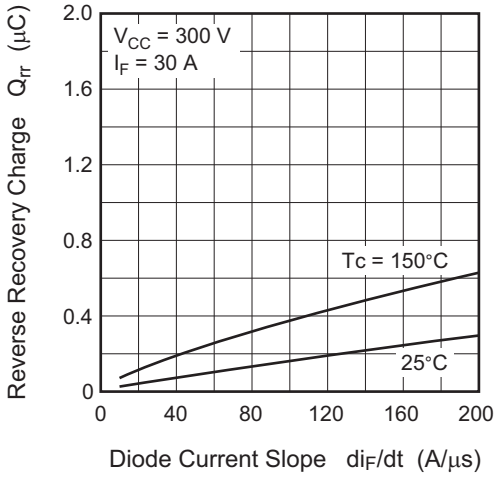
Dynamic Input Characteristics (Typical)



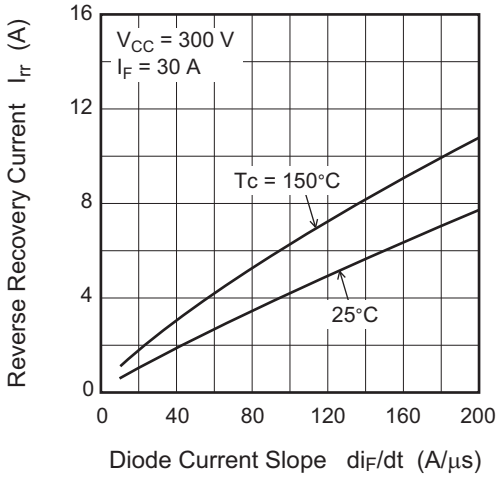
Reverse Recovery Time vs. Diode Current Slope (Typical)



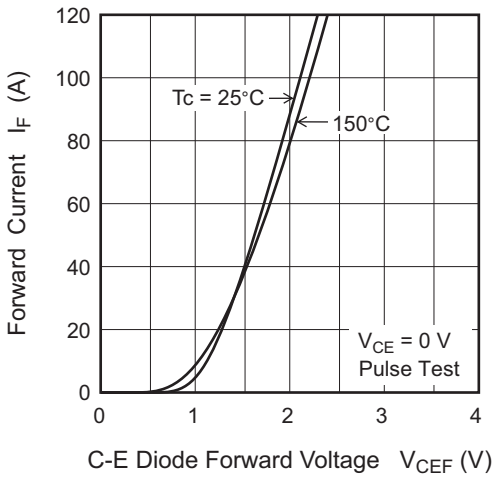
Reverse Recovery Charge vs. Diode Current Slope (Typical)



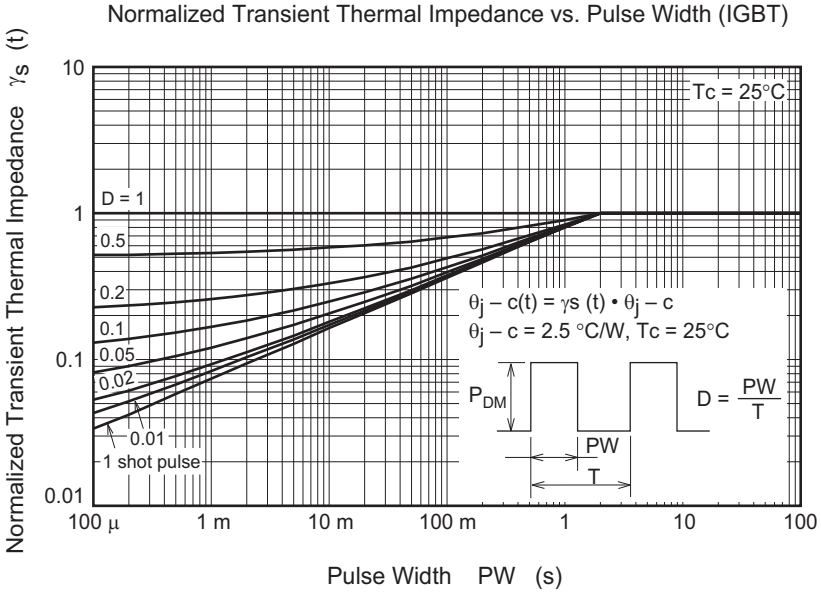
Reverse Recovery Current vs. Diode Current Slope (Typical)



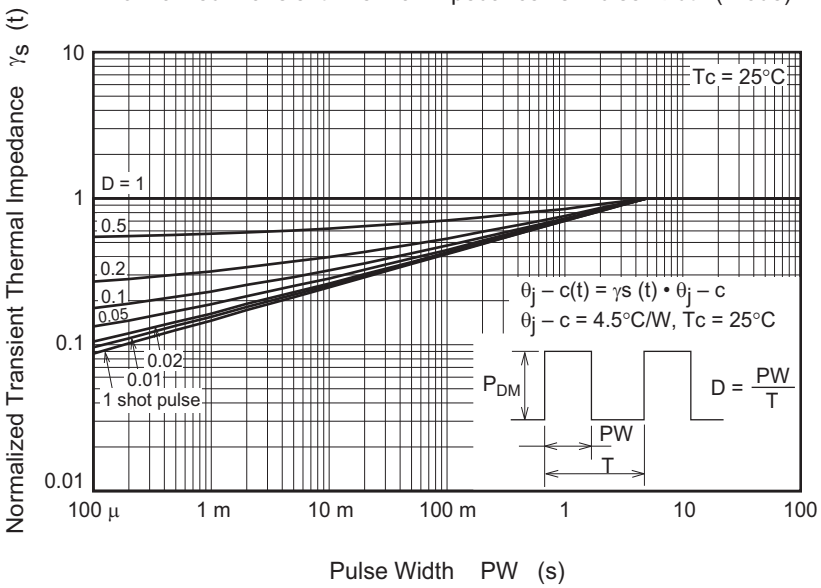
Forward Current vs. Forward Voltage (Typical)



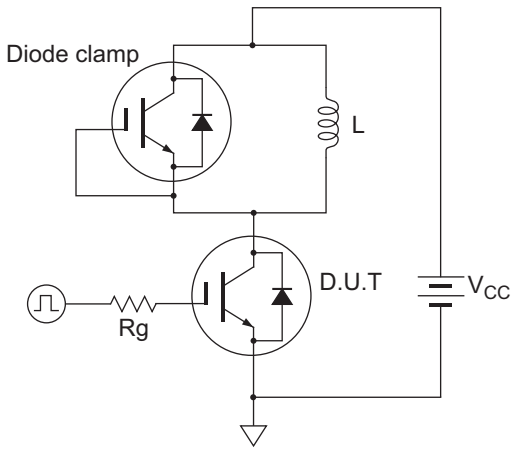
Normalized Transient Thermal Impedance vs. Pulse Width (IGBT)



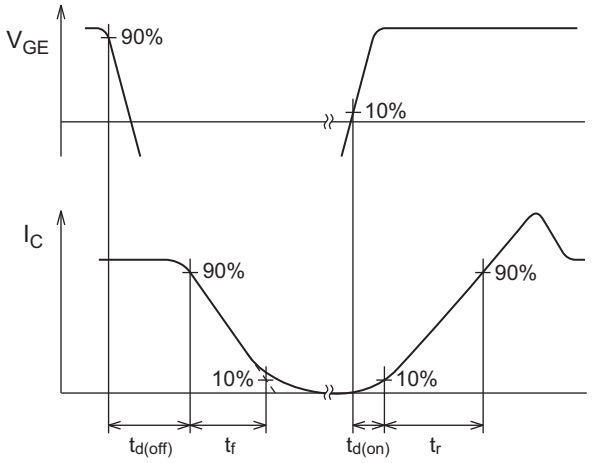
Normalized Transient Thermal Impedance vs. Pulse Width (Diode)



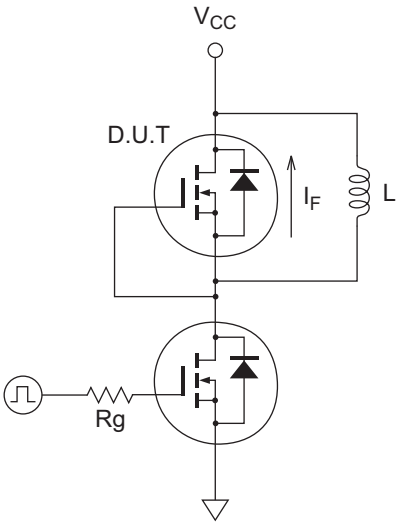
Switching Time Test Circuit



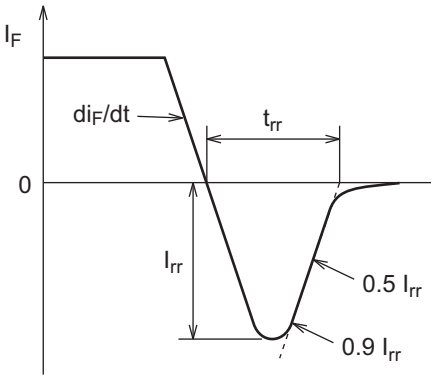
Waveform



Diode Reverse Recovery Time Test Circuit



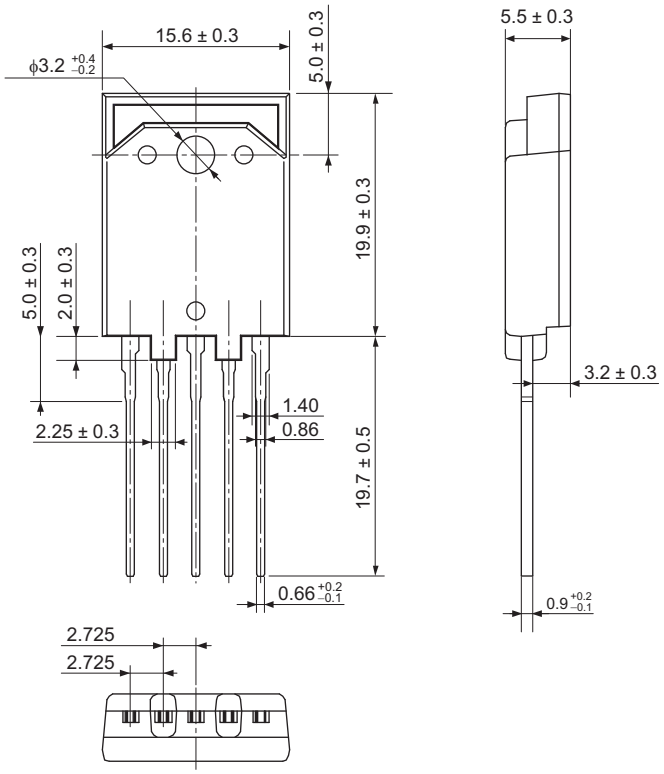
Waveform



Package Dimensions

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
TO-3PFM-5	SC-93	PRSS0005ZB-A	TO-3PFM-5	5.3g

Unit: mm



Ordering Information

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

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