

RJH60M1DPP-M0

600V - 8A - IGBT

Application: Inverter

R07DS0528EJ0300

Rev.3.00

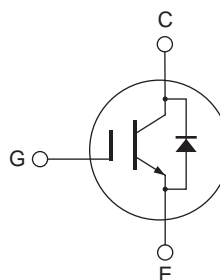
May 25, 2012

Features

- Short circuit withstand time (8 μ s typ.)
- Low collector to emitter saturation voltage
 $V_{CE(sat)} = 1.9$ V typ. (at $I_C = 8$ A, $V_{GE} = 15$ V, $T_a = 25^\circ\text{C}$)
- Built in fast recovery diode (75 ns typ.) in one package
- Trench gate and thin wafer technology
- High speed switching
 $t_f = 70$ ns typ. (at $V_{CC} = 300$ V, $V_{GE} = 15$ V, $I_C = 8$ A, $R_g = 5$ Ω , inductive load)

Outline

RENESAS Package code: PRSS0003AF-A
(Package name: TO-220FL)



1. Gate
2. Collector
3. Emitter

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	16	A
	$T_c = 100^\circ\text{C}$	I_C	8	A
Collector peak current		$i_{c(peak)}$ ^{Note1}	20	A
Collector to emitter diode forward current		i_{DF}	8	A
Collector to emitter diode forward peak current		$i_{DF(peak)}$ ^{Note1}	32	A
Collector dissipation		P_C ^{Note2}	30	W
Junction to case thermal resistance (IGBT)		θ_{j-c} ^{Note2}	4.1	$^\circ\text{C} / \text{W}$
Junction to case thermal resistance (Diode)		θ_{j-cd} ^{Note2}	7.2	$^\circ\text{C} / \text{W}$
Junction temperature		T_j	150	$^\circ\text{C}$
Storage temperature		T_{stg}	-55 to +150	$^\circ\text{C}$

Notes: 1. $PW \leq 10$ μ s, duty cycle $\leq 1\%$

2. Value at $T_c = 25^\circ\text{C}$

Electrical Characteristics

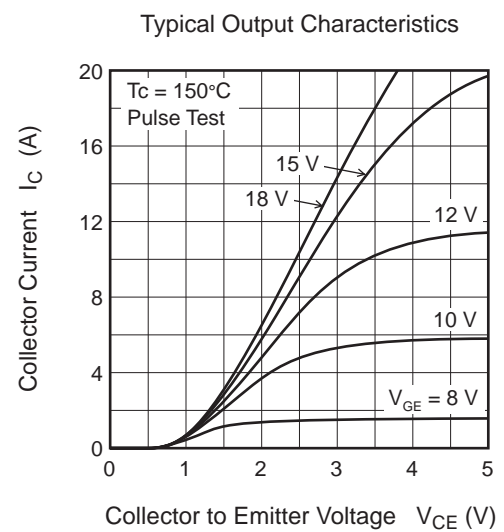
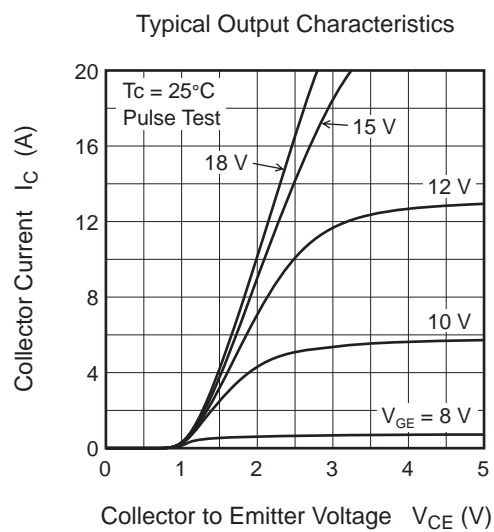
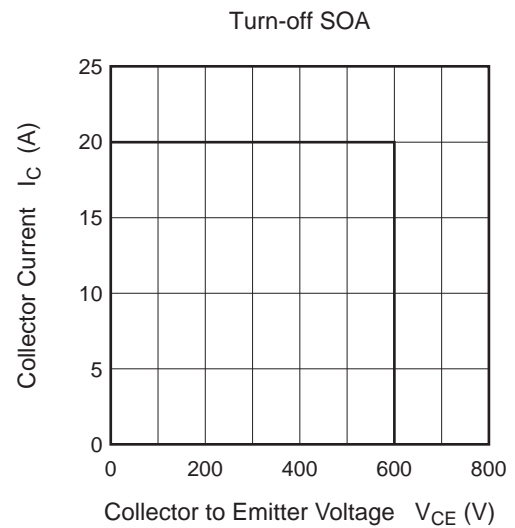
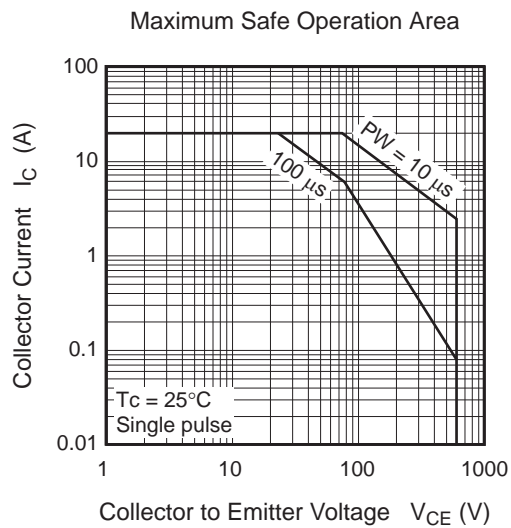
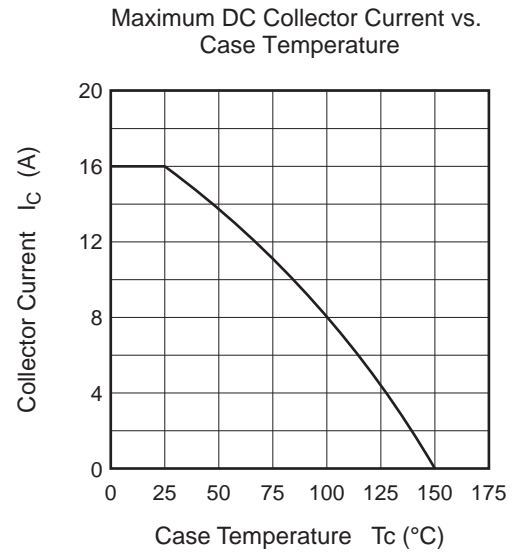
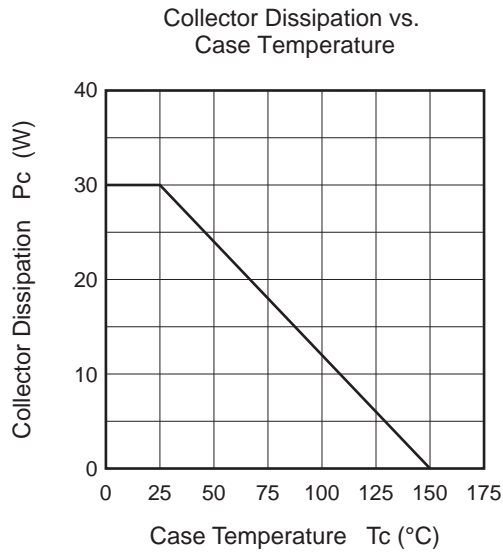
(Ta = 25°C)

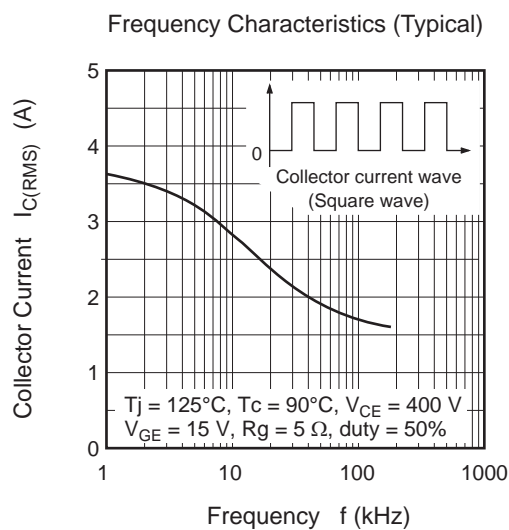
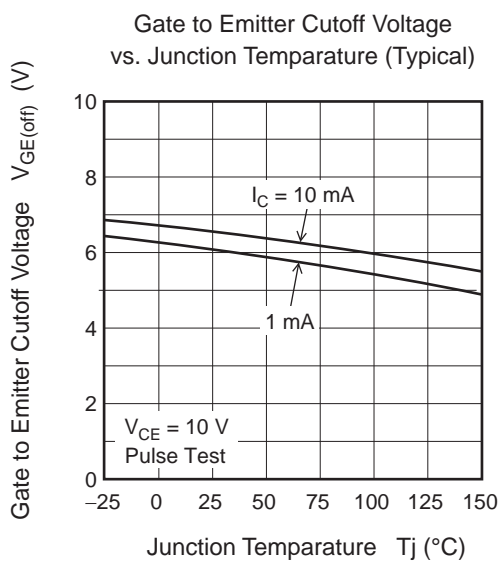
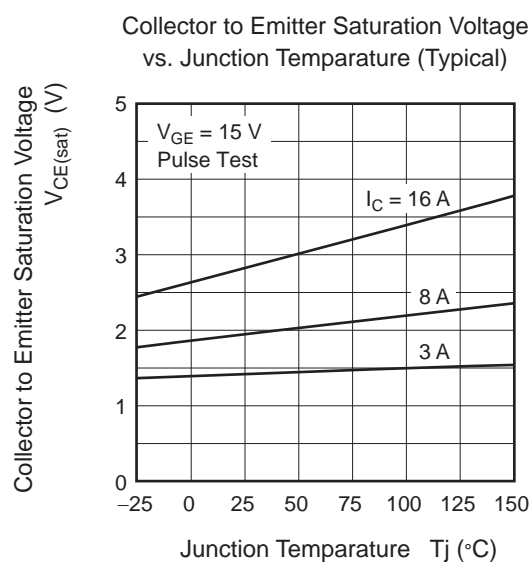
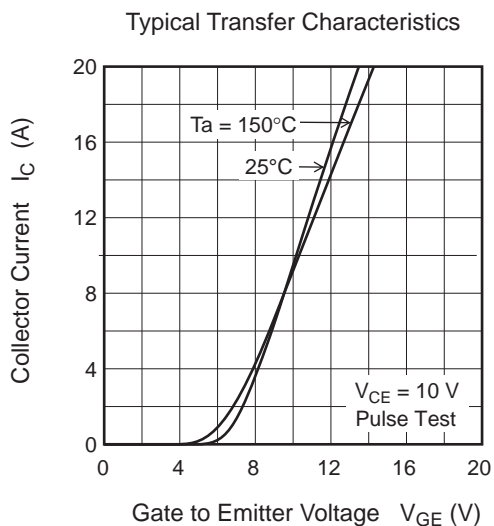
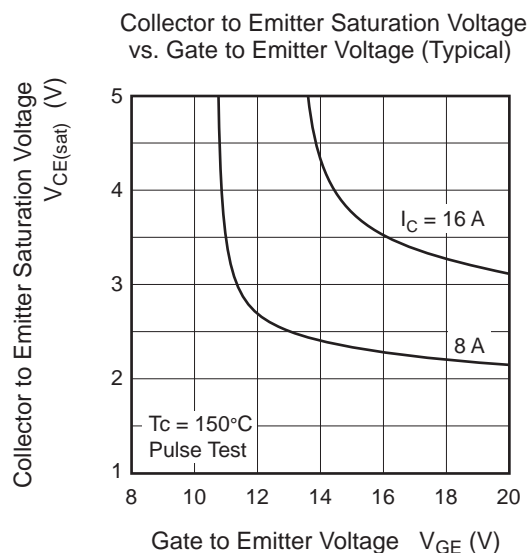
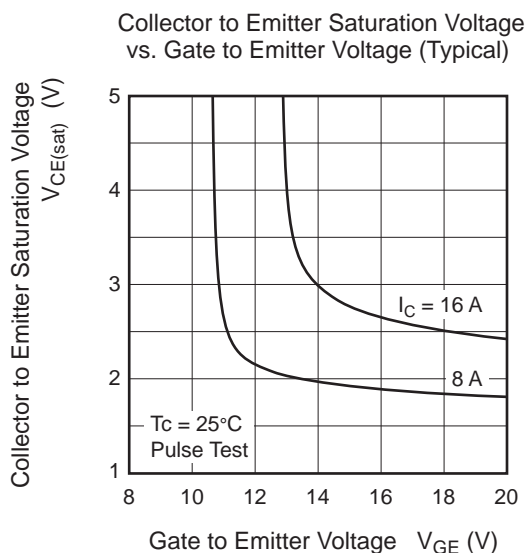
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to emitter breakdown voltage	$V_{(BR)CES}$	600	—	—	V	$I_C = 10 \mu A$, $V_{GE} = 0$
Zero gate voltage collector current / Diode reverse current	I_{CES} / I_R	—	—	5	μA	$V_{CE} = 600 V$, $V_{GE} = 0$
Gate to emitter leak current	I_{GES}	—	—	± 1	μA	$V_{GE} = \pm 30 V$, $V_{CE} = 0$
Gate to emitter cutoff voltage	$V_{GE(off)}$	5	—	7	V	$V_{CE} = 10 V$, $I_C = 1 mA$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	1.9	2.4	V	$I_C = 8 A$, $V_{GE} = 15 V$ ^{Note3}
	$V_{CE(sat)}$	—	2.8	—	V	$I_C = 16 A$, $V_{GE} = 15 V$ ^{Note3}
Input capacitance	C_{ies}	—	275	—	pF	$V_{CE} = 25 V$
Output capacitance	C_{oes}	—	25	—	pF	$V_{GE} = 0$
Reverse transfer capacitance	C_{res}	—	10	—	pF	$f = 1 MHz$
Total gate charge	Q_g	—	20.5	—	nC	$V_{GE} = 15 V$
Gate to emitter charge	Q_{ge}	—	3	—	nC	$V_{CE} = 300 V$
Gate to collector charge	Q_{gc}	—	11.5	—	nC	$I_C = 8 A$
Turn-on delay time	$t_{d(on)}$	—	30	—	ns	$V_{CC} = 300 V$
Rise time	t_r	—	12	—	ns	$V_{GE} = 15 V$
Turn-off delay time	$t_{d(off)}$	—	55	—	ns	$I_C = 8 A$
Fall time	t_f	—	70	—	ns	$R_g = 5 \Omega$
Turn-on energy	E_{on}	—	0.08	—	mJ	(Inductive load)
Turn-off energy	E_{off}	—	0.09	—	mJ	
Total switching energy	E_{total}	—	0.17	—	mJ	
Short circuit withstand time	t_{sc}	6	8	—	μs	$T_C = 100 ^\circ C$ $V_{GE} \leq 360 V$, $V_{GE} = 15 V$

FRD Forward voltage	V_F	—	1.4	1.9	V	$I_F = 8 A$ ^{Note3}
FRD reverse recovery time	t_{rr}	—	75	—	ns	$I_F = 8 A$
FRD reverse recovery charge	Q_{rr}	—	0.1	—	μC	$di_F/dt = 100 A/\mu s$
FRD peak reverse recovery current	I_{rr}	—	3.0	—	A	

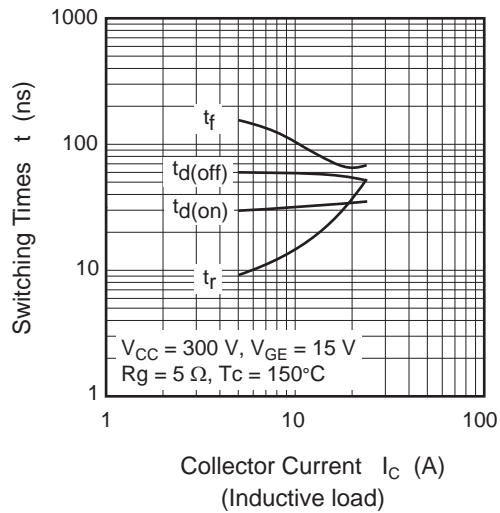
Notes: 3. Pulse test.

Main Characteristics

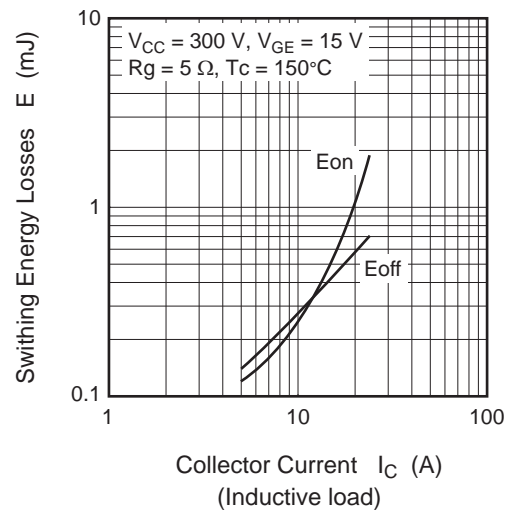




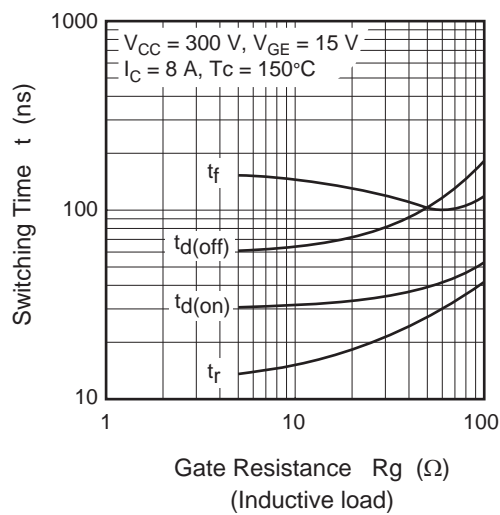
Switching Characteristics (Typical) (1)



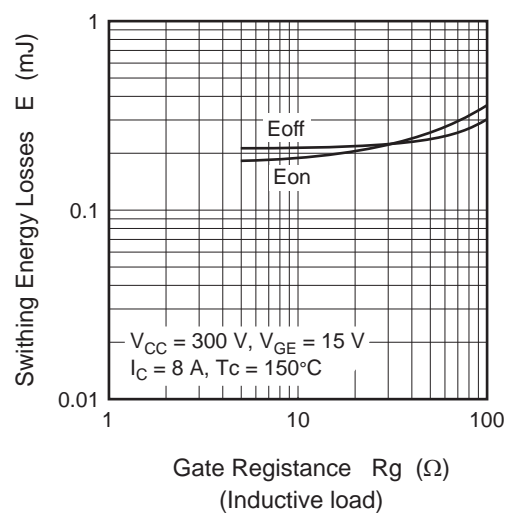
Switching Characteristics (Typical) (2)



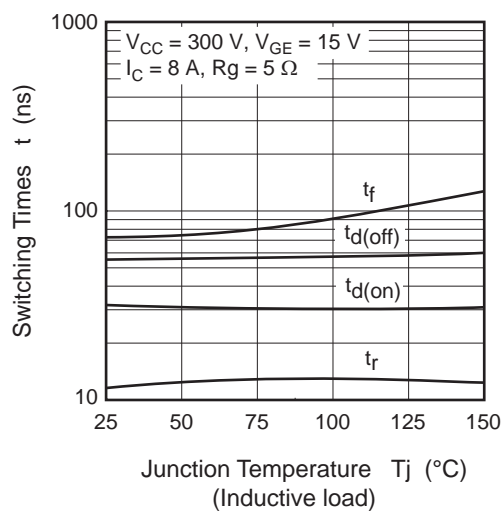
Switching Characteristics (Typical) (3)



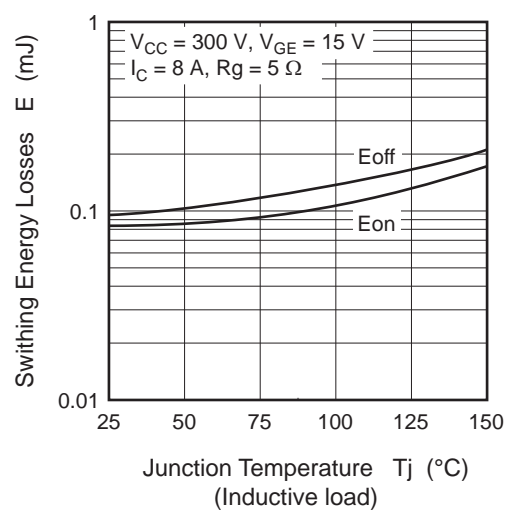
Switching Characteristics (Typical) (4)

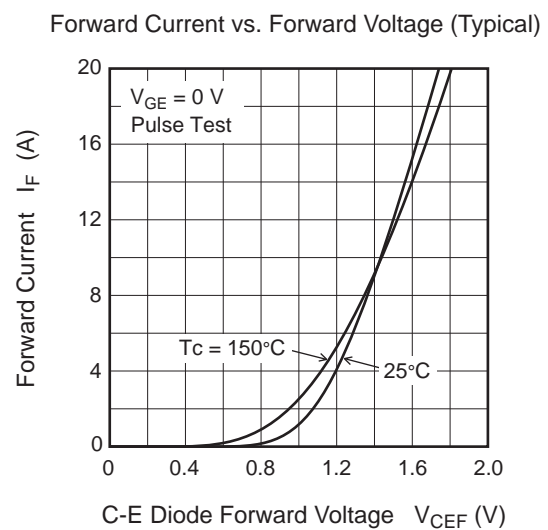
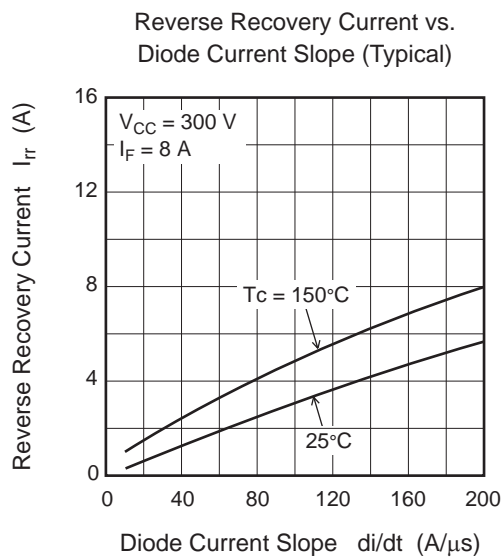
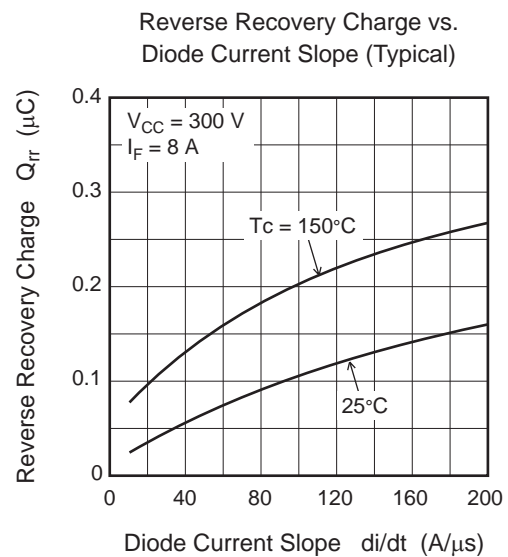
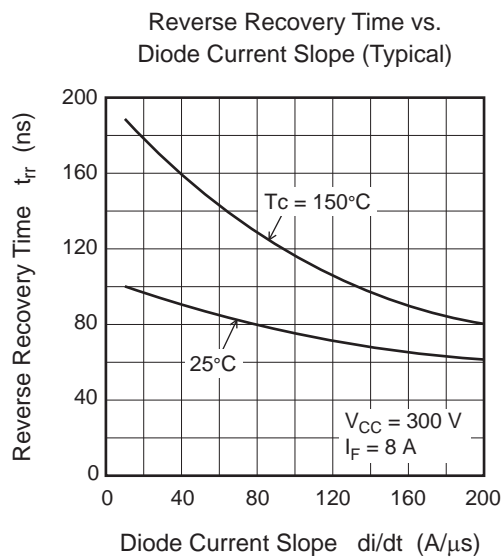
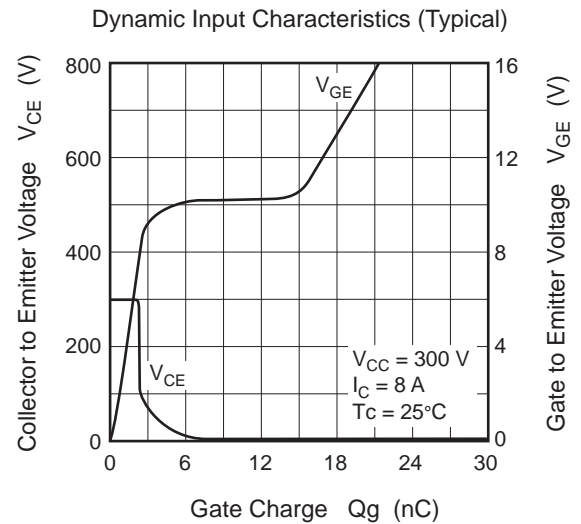
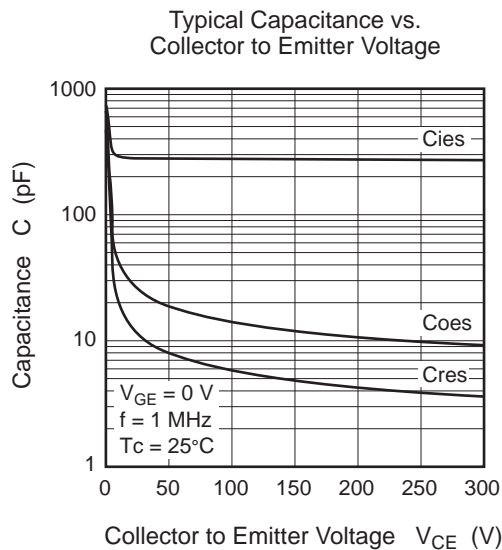


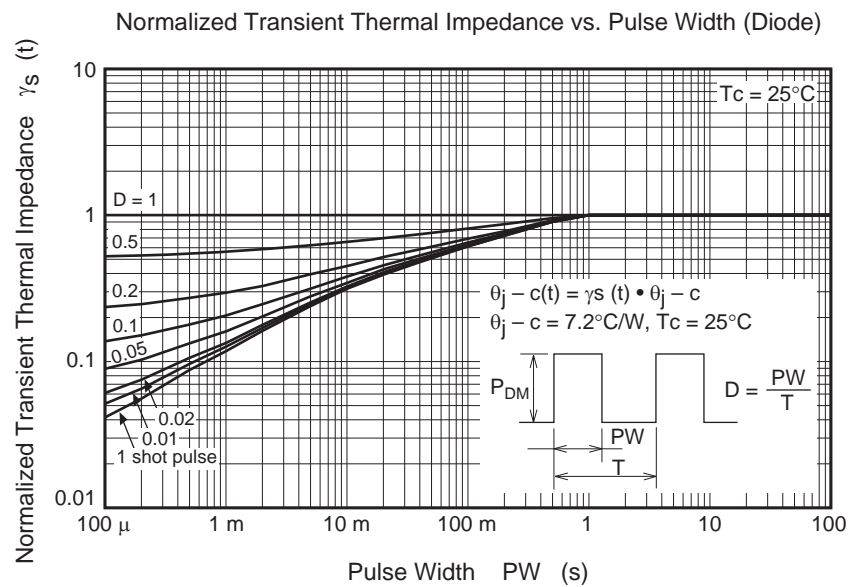
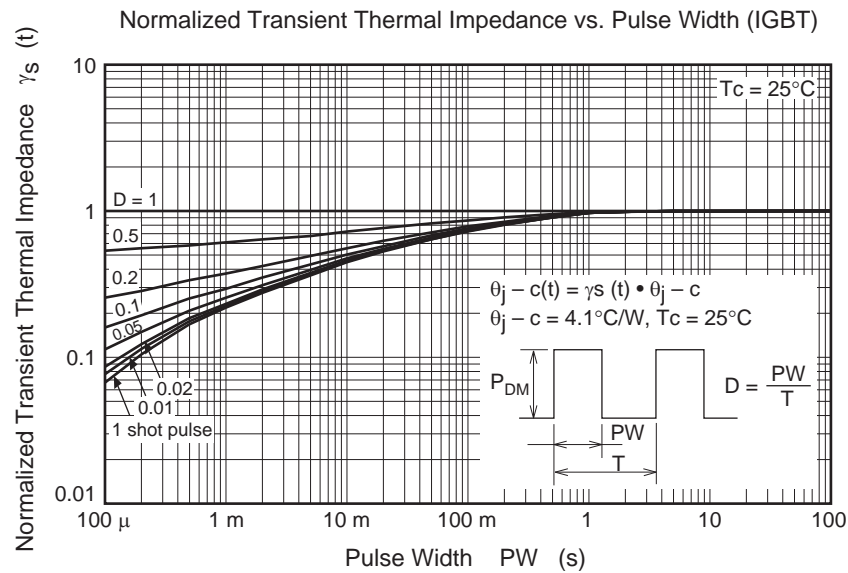
Switching Characteristics (Typical) (5)



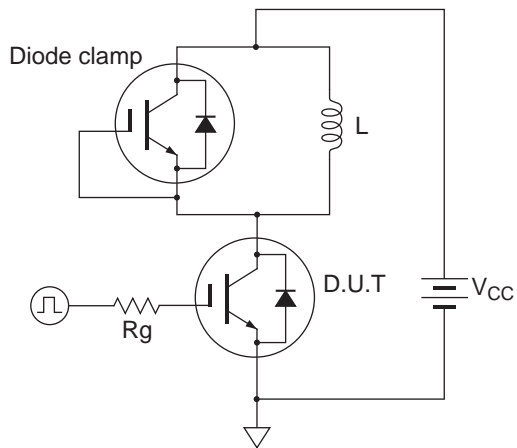
Switching Characteristics (Typical) (6)



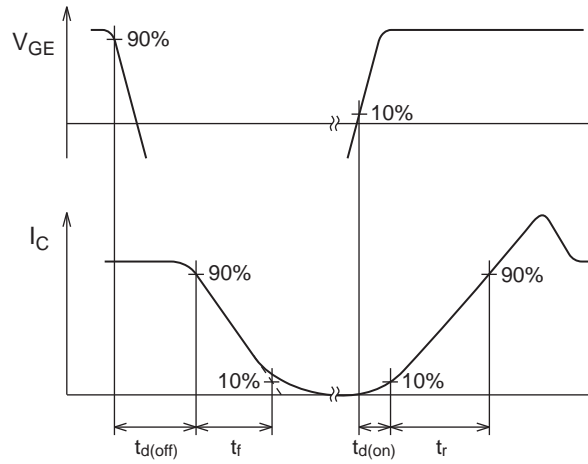




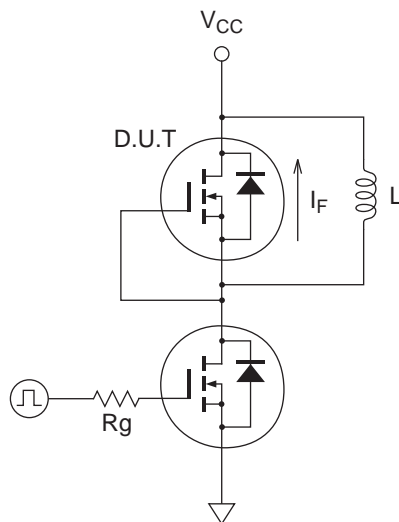
Switching Time Test Circuit



Waveform



Diode Reverse Recovery Time Test Circuit



Waveform



Package Dimension

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]	Unit: mm
TO-220FL	—	PRSS0003AF-A	TO-220FL	1.5g	

The drawing shows the mechanical dimensions of the RJH60M1DPP-M0 package. The top view shows a square body with a central circular feature. The side view shows the package's profile with mounting tabs. The detail view shows the mounting tab structure.

Dimensions (mm):

- Top view: 10.0 ± 0.3 (width), 15.0 ± 0.3 (height), 3.0 ± 0.3 (central feature width), 6.5 ± 0.3 (central feature height), 3.2 ± 0.2 (central feature diameter).
- Side view: 2.8 ± 0.2 (width), 12.5 ± 0.5 (height), 3.6 ± 0.3 (mounting tab height), 1.15 ± 0.2 (mounting tab width), 0.75 ± 0.15 (mounting tab thickness), 2.54 ± 0.25 (mounting tab pitch), 0.40 ± 0.15 (mounting tab width).
- Detail view: 4.5 ± 0.2 (width), 2.6 ± 0.2 (height).

Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJH60M1DPP-M0#T2	600 pcs	Box (Tube)

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