

# RJH60D1DPP-M0

Silicon N Channel IGBT

Application: Inverter

R07DS0158EJ0300

Rev.3.00

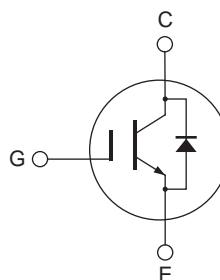
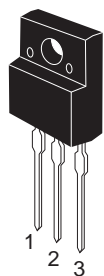
Nov 16, 2010

## Features

- Short circuit withstand time (5  $\mu$ s typ.)
- Low collector to emitter saturation voltage  
 $V_{CE(sat)} = 1.9$  V typ. (at  $I_C = 10$  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  
 $t_f = 90$  ns typ. (at  $V_{CC} = 300$  V,  $V_{GE} = 15$  V,  $I_C = 10$  A,  $R_g = 5 \Omega$ , 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	$V_{GES}$	$\pm 30$	V	
Collector current	$T_c = 25^\circ\text{C}$	$I_C$	20	A
	$T_c = 100^\circ\text{C}$	$I_C$	10	A
Collector peak current	$i_{c(peak)}$ <sup>Note1</sup>	40	A	
Collector to emitter diode forward current	$i_{DF}$	10	A	
Collector to emitter diode forward peak current	$i_{D(peak)}$ <sup>Note1</sup>	40	A	
Collector dissipation	$P_C$ <sup>Note2</sup>	20.8	W	
Junction to case thermal resistance (IGBT)	$\theta_{j-c}$ <sup>Note2</sup>	6.0	$^\circ\text{C} / \text{W}$	
Junction to case thermal resistance (Diode)	$\theta_{j-cd}$ <sup>Note2</sup>	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.  $PW \leq 10 \mu\text{s}$ , duty cycle  $\leq 1\%$

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

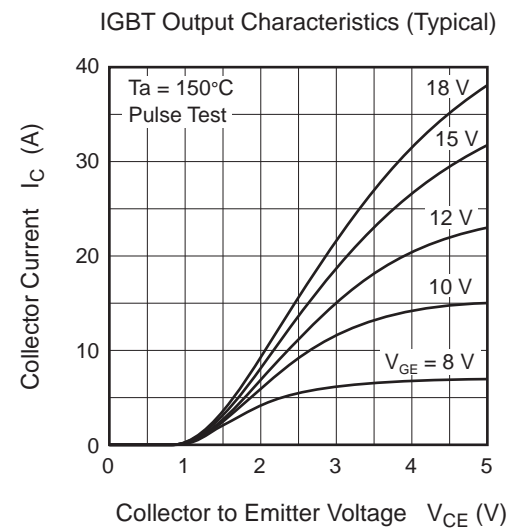
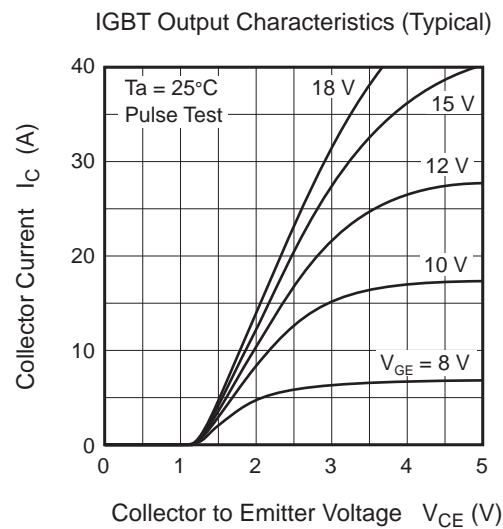
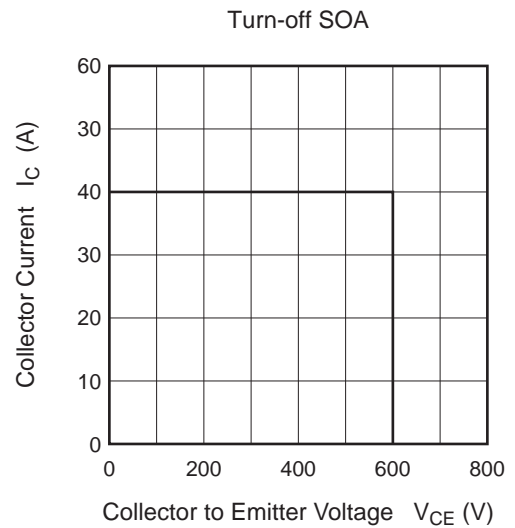
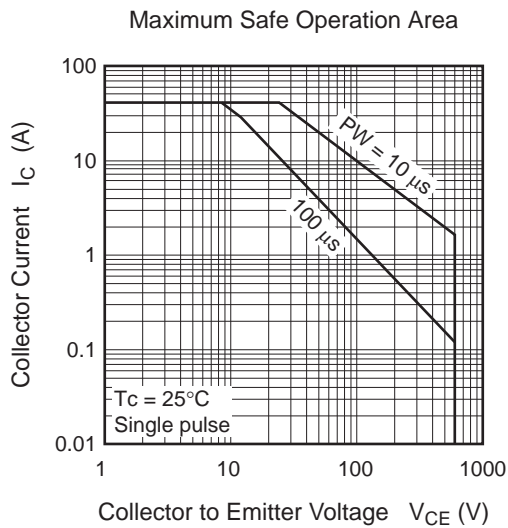
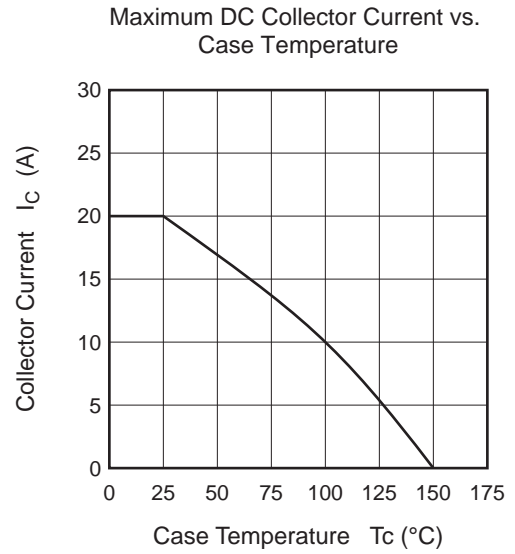
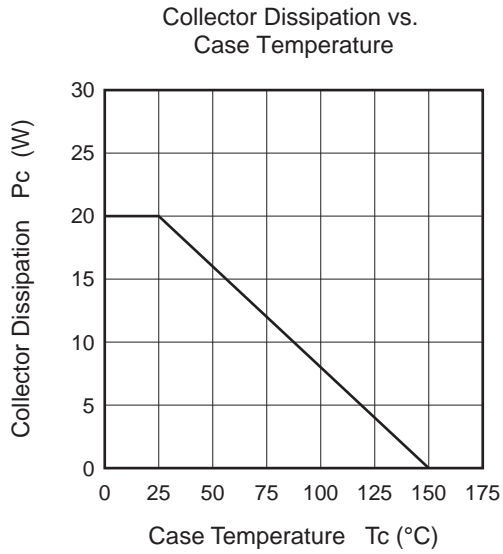
## Electrical Characteristics

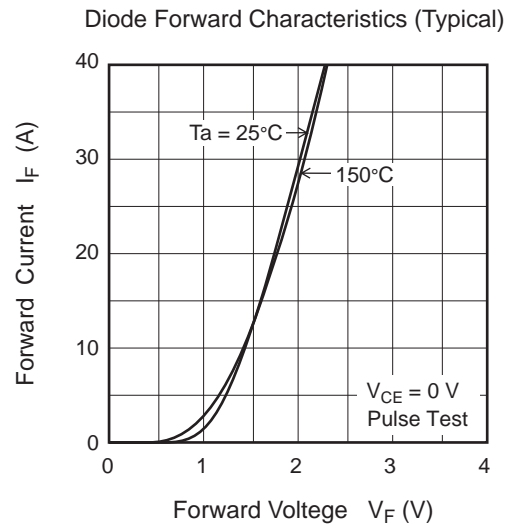
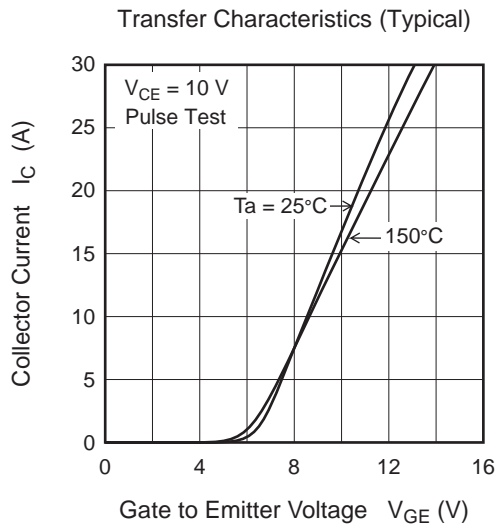
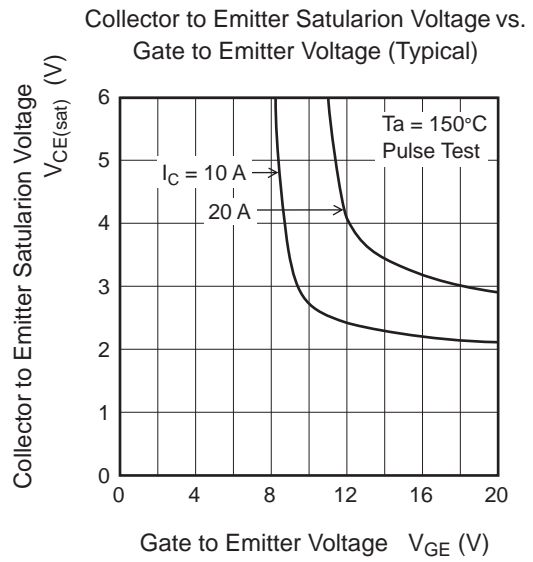
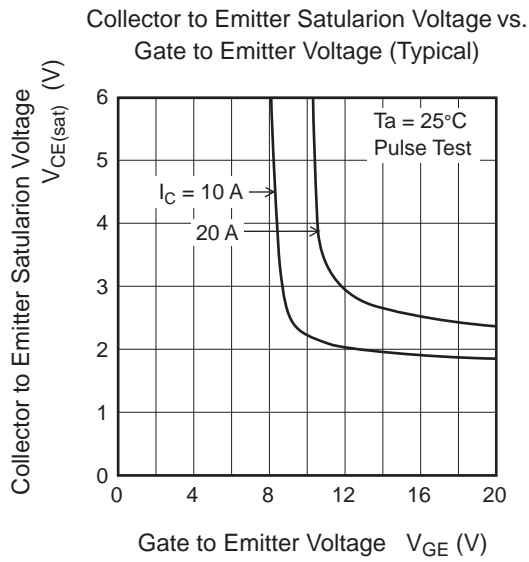
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current / Diode reverse current	$I_{CES} / I_R$	—	—	5	$\mu\text{A}$	$V_{CE} = 600 \text{ V}, V_{GE} = 0$
Gate to emitter leak current	$I_{GES}$	—	—	$\pm 1$	$\mu\text{A}$	$V_{GE} = \pm 30 \text{ V}, V_{CE} = 0$
Gate to emitter cutoff voltage	$V_{GE(off)}$	4.0	—	6.0	V	$V_{CE} = 10 \text{ V}, I_C = 1 \text{ mA}$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	1.9	2.5	V	$I_C = 10 \text{ A}, V_{GE} = 15 \text{ V}$ <sup>Note3</sup>
	$V_{CE(sat)}$	—	2.6	—	V	$I_C = 20 \text{ A}, V_{GE} = 15 \text{ V}$ <sup>Note3</sup>
Input capacitance	$C_{ies}$	—	275	—	pF	$V_{CE} = 25 \text{ V}$
Output capacitance	$C_{oes}$	—	25	—	pF	$V_{GE} = 0$
Reveres transfer capacitance	$C_{res}$	—	7.5	—	pF	$f = 1 \text{ MHz}$
Total gate charge	$Q_g$	—	12.0	—	nC	$V_{GE} = 15 \text{ V}$
Gate to emitter charge	$Q_{ge}$	—	2.0	—	nC	$V_{CE} = 300 \text{ V}$
Gate to collector charge	$Q_{gc}$	—	6.0	—	nC	$I_C = 10 \text{ A}$
Switching time	$t_{d(on)}$	—	30	—	ns	$V_{CC} = 300 \text{ V}, V_{GE} = 15 \text{ V}$
	$t_r$	—	13	—	ns	$I_C = 10 \text{ A}$
	$t_{d(off)}$	—	80	—	ns	$R_g = 5 \Omega$
	$t_f$	—	90	—	ns	(Inductive load)
Short circuit withstand time	$t_{sc}$	3.0	5.0	—	$\mu\text{s}$	$V_{GE} \leq 360 \text{ V}, V_{GE} = 15 \text{ V}$
FRD Forward voltage	$V_F$	—	1.4	1.9	V	$I_F = 10 \text{ A}$ <sup>Note3</sup>
FRD reverse recovery time	$t_{rr}$	—	100	—	ns	$I_F = 10 \text{ A}$ $di_F/dt = 100 \text{ A}/\mu\text{s}$

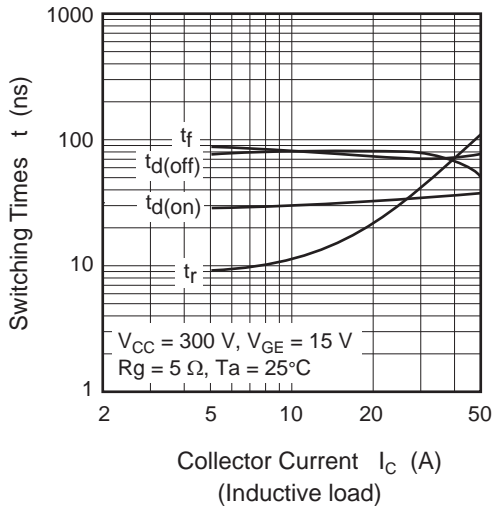
Notes: 3. Pulse test.

### Main Characteristics

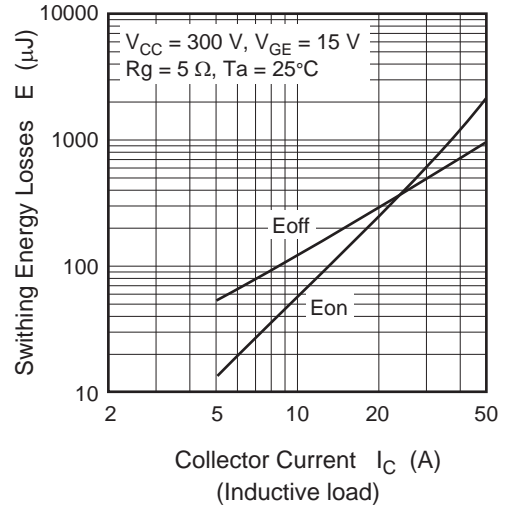




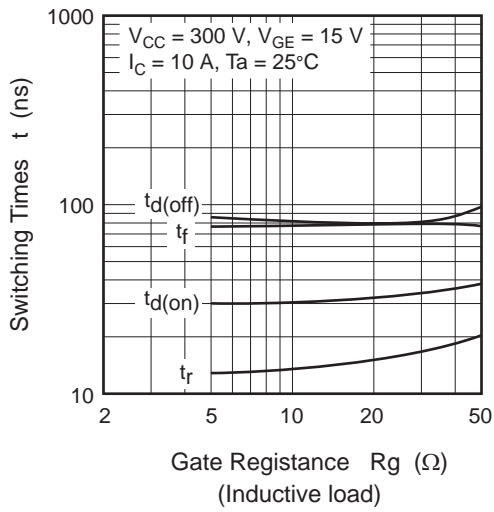
Switching Characteristics (Typical) (1)



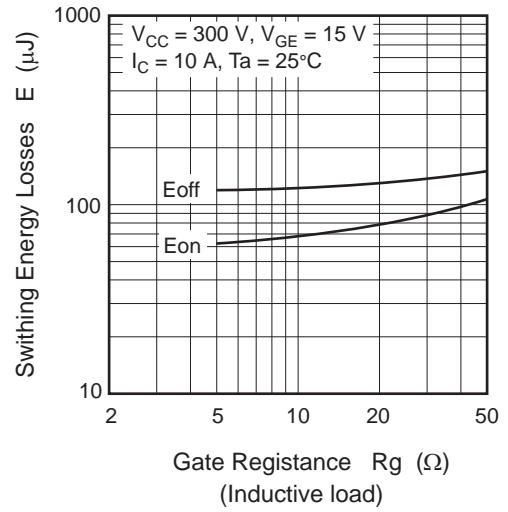
Switching Characteristics (Typical) (2)



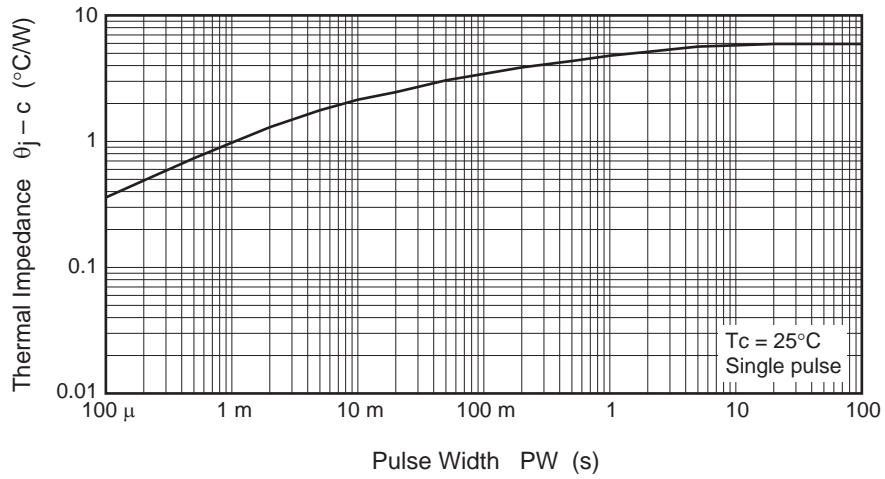
Switching Characteristics (Typical) (3)



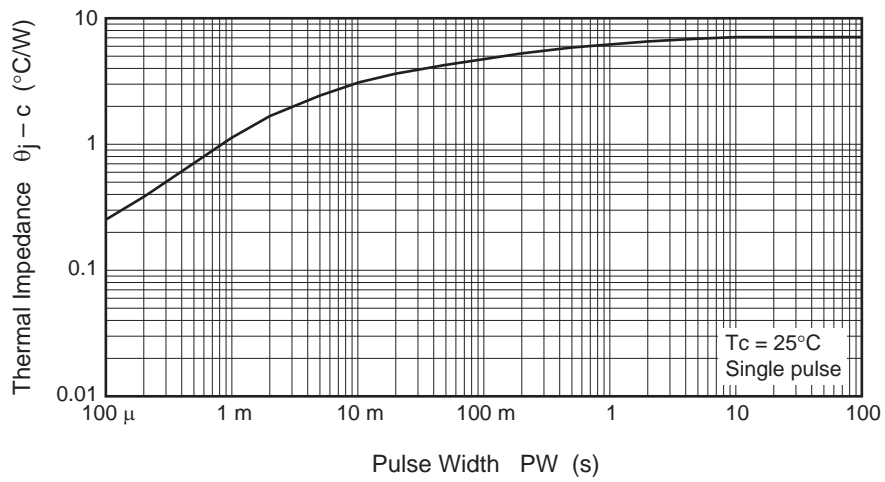
Switching Characteristics (Typical) (4)



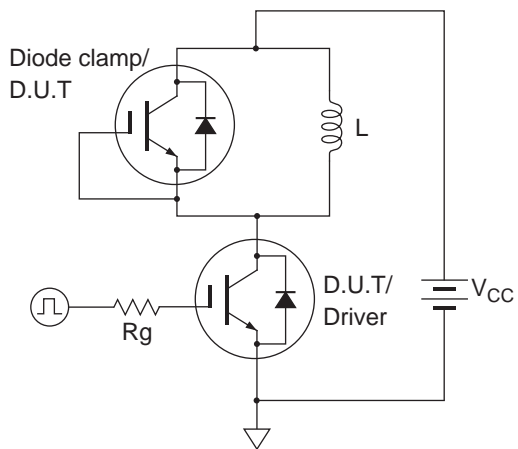
Thermal Impedance vs. Pulse Width (IGBT)



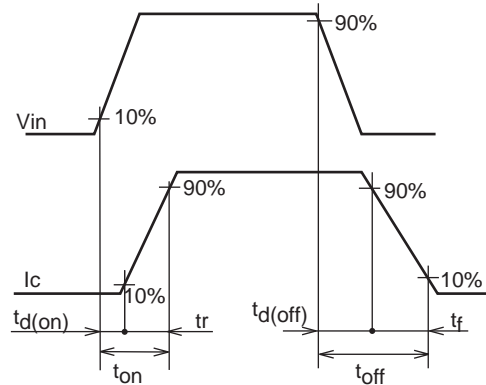
Thermal Impedance vs. Pulse Width (Diode)



Switching Time Test Circuit



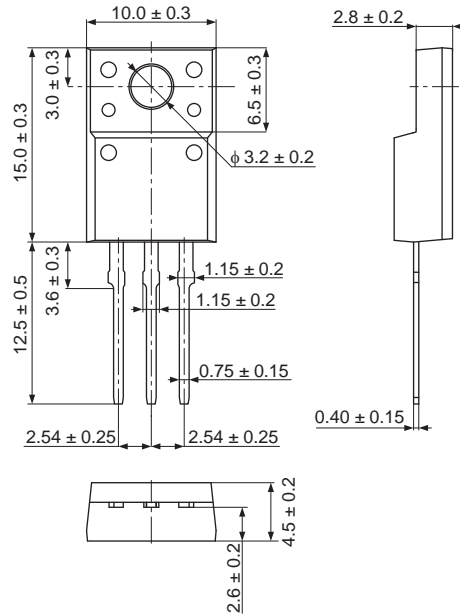
Waveform



### Package Dimension

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

Unit: mm



### Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJH60D1DPP-M0-T2	1050 pcs	Box (Tube)

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