

RBN40H65T1FPQ-A0

650V - 40A - IGBT

Application: Uninterruptible Power Supply

R07DS1379EJ0004

Rev.0.04

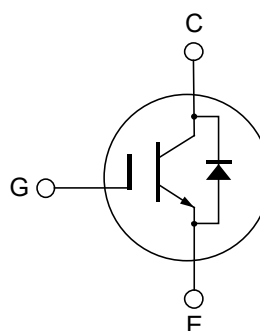
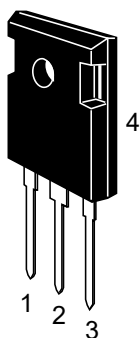
Dec 28, 2016

Features

- Low collector to emitter saturation voltage
 $V_{CE(sat)} = 1.5 \text{ V typ. (at } I_C = 40 \text{ A, } V_{GE} = 15 \text{ V, } T_a = 25^\circ\text{C)}$
- Built in fast recovery diode in one package
- Trench gate and thin wafer technology (G8H series)
- High speed switching
- Not guarantee short circuit withstand time

Outline

RENESAS Package code: PRSS0003ZH-A
(Package name: TO-247A)



1. Gate
2. Collector
3. Emitter
4. Collector

Absolute Maximum Ratings

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

Item	Symbol	Ratings	Unit
Collector to emitter voltage	V_{CES} / V_R	650	V
Gate to emitter voltage	V_{GES}	± 30	V
Collector current	$T_c = 25^\circ\text{C}$	I_C	80
	$T_c = 100^\circ\text{C}$	I_C	40
Collector peak current	$I_{C(peak)}$ Note1	(160)	A
Collector to emitter diode Forward current	$T_c = 25^\circ\text{C}$	I_{DF}	60
	$T_c = 100^\circ\text{C}$	I_{DF}	30
Collector to emitter diode forward peak current	$I_{DF(peak)}$ Note1	(160)	A
Collector dissipation	P_C Note 2	(220)	W
Junction to case thermal impedance (IGBT)	θ_{j-c}	(0.68)	$^\circ\text{C/W}$
Junction to case thermal resistance (Diode)	θ_{j-cd}	(0.94)	$^\circ\text{C/W}$
Junction temperature	T_j Note2	175	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

Note: Continuous heavy condition (e.g. high temperature/voltage/current or high variation of temperature) may affect a reliability even if it are within the absolute maximum ratings. Please consider derating condition for appropriate reliability in reference Renesas Semiconductor Reliability Handbook (Recommendation for Handling and Usage of Semiconductor Devices) and individual reliability data.

Electrical Characteristics

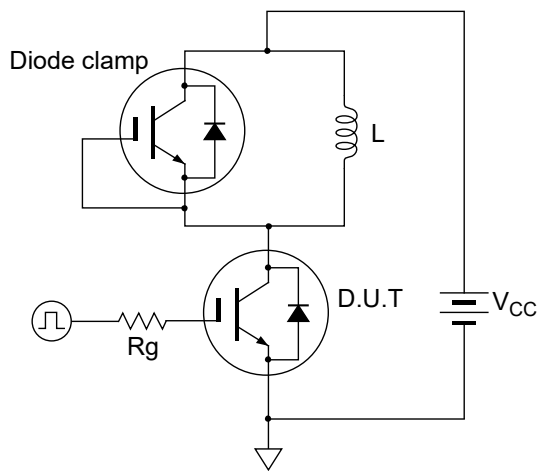
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current / Diode reverse current	I_{CES} / I_R	—	—	(200)	μA	$V_{CE} = 650 V, V_{GE} = 0$
Gate to emitter leak current	I_{GES}	—	—	(± 1)	μA	$V_{GE} = \pm 30 V, V_{CE} = 0$
Gate to emitter cutoff voltage	$V_{GE(off)}$	(4.1)	—	(5.9)	V	$V_{CE} = 10 V, I_C = 0.8 mA$
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	(1.5)	(2.0)	V	$I_C = 40 A, V_{GE} = 15 V$ ^{Note3}
Input capacitance	C_{ies}	—	(940)	—	pF	$V_{CE} = 25 V$ $V_{GE} = 0$ $f = 1 MHz$
Output capacitance	C_{oes}	—	(130)	—	pF	
Reverse transfer capacitance	C_{res}	—	(10)	—	pF	
Total gate charge	Q_g	—	(36)	—	nC	$V_{GE} = 15 V$ $V_{CE} = 400 V$ $I_C = 40 A$
Gate to emitter charge	Q_{ge}	—	(8)	—	nC	
Gate to collector charge	Q_{gc}	—	(17)	—	nC	
Turn-on delay time	$t_{d(on)}$	—	(22)	—	ns	$V_{CC} = 400 V$ $V_{GE} = 15 V/-5V$ $I_C = 40 A$ $R_g = 16 \Omega$ $T_C = 25^\circ C$ Inductive load ^{Note4}
Rise time	t_r	—	(19)	—	ns	
Turn-off delay time	$t_{d(off)}$	—	(96)	—	ns	
Fall time	t_f	—	(45)	—	ns	
Turn-on loss energy	E_{on}	—	(0.62)	—	mJ	
Turn-off loss energy	E_{off}	—	(0.52)	—	mJ	
Total switching energy	E_{total}	—	(1.14)	—	mJ	
Turn-on delay time	$t_{d(on)}$	—	(21)	—	ns	$V_{CC} = 400 V$ $V_{GE} = 15 V/-5V$ $I_C = 40 A$ $R_g = 16 \Omega$ $T_C = 150^\circ C$ Inductive load ^{Note4}
Rise time	t_r	—	(20)	—	ns	
Turn-off delay time	$t_{d(off)}$	—	(120)	—	ns	
Fall time	t_f	—	(60)	—	ns	
Turn-on loss energy	E_{on}	—	(0.98)	—	mJ	
Turn-off loss energy	E_{off}	—	(0.88)	—	mJ	
Total switching energy	E_{total}	—	(1.86)	—	mJ	
FRD forward voltage	V_F	—	(1.7)	(2.2)	V	$I_F = 30 A$ ^{Note3}
FRD reverse recovery time	t_{rr}	—	(55)	—	ns	$I_F = 30 A, di_F/dt = 300 A/\mu s$
FRD reverse recovery charge	Q_{rr}	—	(0.21)	—	μC	
FRD peak reverse recovery current	I_{rr}	—	(7)	—	A	

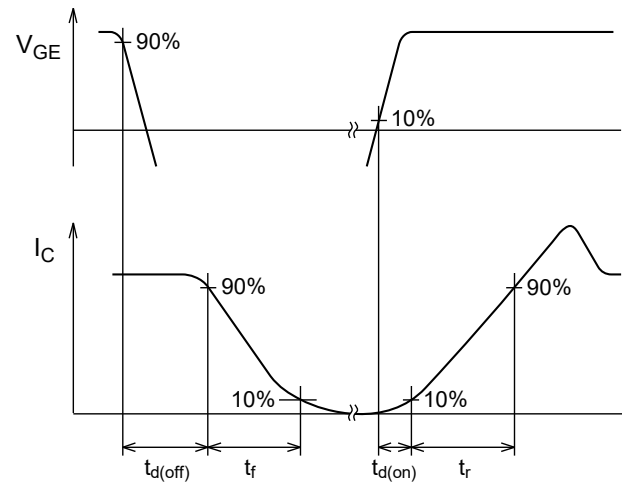
Notes:

1. $PW \leq 10 \mu s$, duty cycle $\leq 1\%$
2. Please use this device in the thermal conditions which the junction temperature does not exceed 175°C.
Renesas IGBT Application Note is disclosed about reliability test and application condition up to 175°C.
3. Pulse test
4. Switching time test circuit and waveform are shown below.

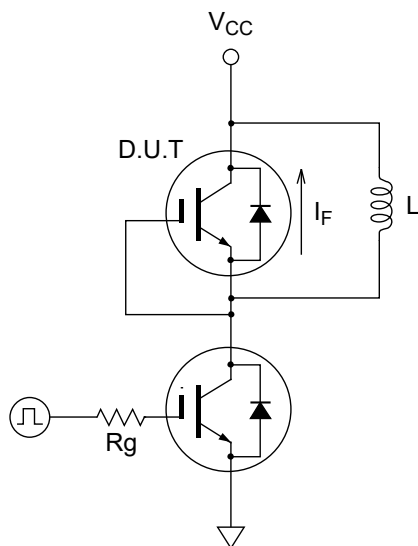
Switching Time Test Circuit



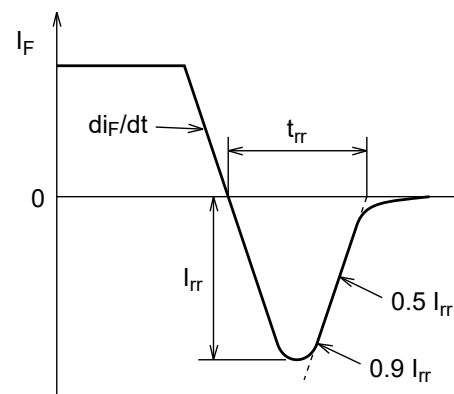
Waveform



Diode Reverse Recovery Time Test Circuit



Waveform



Package Dimensions

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]	Unit: mm
TO-247A	-	PRSS0003ZH-A	-	6.14g	

Ordering Information

Orderable Part Number	Quantity	Shipping Container
RBN40H65T1FPQ-A0#CB0	240 pcs	Box (Tube)

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