RBN40H125S1FPQ-A0

1250V - 40A - IGBT
Application: Uninterruptible Power Supply

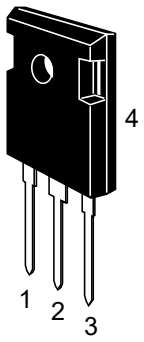
R07DS1380EJ0004
Rev.0.04
Dec 28, 2016

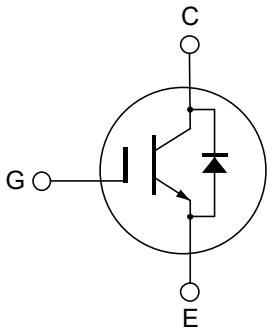
Features

- Low collector to emitter saturation voltage
  $V_{CE(sat)}$ = 1.8 V typ. (at I_C = 40 A, V_{GE} = 15 V, Ta = 25°C)
- Built in fast recovery diode in one package
- Trench gate and thin wafer technology (G8H series)
- High speed switching
- Short circuit withstands time (10 μs min.)

Outline

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





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

Absolute Maximum Ratings

(Tc = 25°C)

Item		Symbol	Ratings	Unit
Collector to emitter voltage		V_{CES} / V_R	1250	V
Gate to emitter voltage		V_{GES}	±30	V
Collector current	Tc = 25 °C	I_C	80	A
	Tc = 100 °C	I_C	40	A
Collector peak current		I_C(peak) Note1	(120)	A
Collector to emitter diode Forward current	Tc = 25 °C	I_{DF}	50	A
	Tc = 100 °C	I_{DF}	25	A
Collector to emitter diode forward peak current		I_{DF}(peak) Note1	(120)	A
Collector dissipation		P_C Note 2	(394)	W
Junction to case thermal impedance (IGBT)		θj-c	(0.38)	°C/W
Junction to case thermal resistance (Diode)		θj-cd	(1.5)	°C/ W
Junction temperature		Tj Note2	175	°C
Storage temperature		Tstg	–55 to +150	°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)

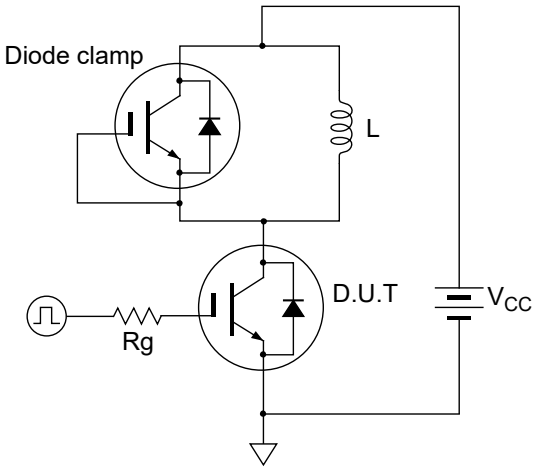
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current / Diode reverse current	I_{CES} / I_R	—	—	(200)	μA	V_{CE} = 1250 V, V_{GE} = 0
Gate to emitter leak current	I_{GES}	—	—	(±1)	μA	V_{GE} = ±30 V, V_{CE} = 0
Gate to emitter cutoff voltage	$V_{GE(off)}$	(5.0)	—	(6.8)	V	V_{CE} = 10V, I_C = 1.33 mA
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	(1.8)	2.34	V	I_C = 40 A, V_{GE} = 15V Note3
Input capacitance	Cies	—	(2640)	—	pF	V_{CE} = 25 V V_{GE} = 0 f = 1 MHz
Output capacitance	Coes	—	(135)	—	pF	
Reverse transfer capacitance	Cres	—	(18)	—	pF	
Total gate charge	Qg	—	(95)	—	nC	VGE = 15 V VCE = 600 V IC = 40 A
Gate to emitter charge	Qge	—	(25)	—	nC	
Gate to collector charge	Qgc	—	(46)	—	nC	
Turn-on delay time	$t_{d(on)}$	—	(23)	—	ns	V_{CC} = 600 V V_{GE} = 15 V/-15V I_C = 40 A Rg = 10 Ω Tc=25℃ Inductive load Note4
Rise time	t_r	—	(16)	—	ns	
Turn-off delay time	$t_{d(off)}$	—	(120)	—	ns	
Fall time	t_f	—	(192)	—	ns	
Turn-on loss energy	E_{on}	—	(2.1)	—	mJ	
Turn-off loss energy	E_{off}	—	(1.9)	—	mJ	
Total switching energy	E_{total}	—	(4.0)	—	mJ	
Turn-on delay time	$t_{d(on)}$	—	(15)	—	ns	V_{CC} = 600 V V_{GE} = 15 V/-15V I_C = 40 A Rg = 10 Ω Tc=150℃ Inductive load Note4
Rise time	t_r	—	(24)	—	ns	
Turn-off delay time	$t_{d(off)}$	—	(142)	—	ns	
Fall time	t_f	—	(223)	—	ns	
Turn-on loss energy	E_{on}	—	(3.3)	—	mJ	
Turn-off loss energy	E_{off}	—	(3.1)	—	mJ	
Total switching energy	E_{total}	—	(6.4)	—	mJ	
Short circuit withstand time Note5	tsc	(10)	—	—	μs	V_{CC} ≤ 720 V, V_{GE} = 15 V Tc ≤ 150°C
Short circuit collector saturation current Note5	Ic,sc	(120)	—	—	A	

FRD forward voltage	V_F	—	(2.8)	(3.64)	V	I_F = 25 A Note3
FRD reverse recovery time	t_{rr}	—	(146)	—	ns	I_F = 25 A, di_F/dt = 300 A/μs
FRD reverse recovery charge	Q_{rr}	—	(0.93)	—	μC	
FRD peak reverse recovery current	I_{rr}	—	(12)	—	A	

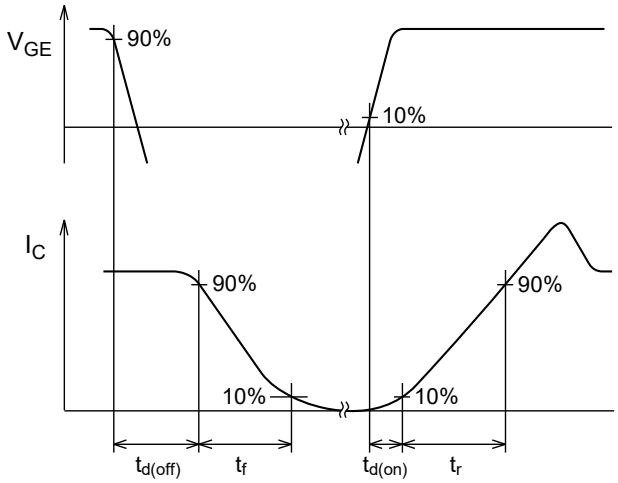
Notes:

1. PW ≤ 10 μs, duty cycle ≤ 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.
5. Verified by design.

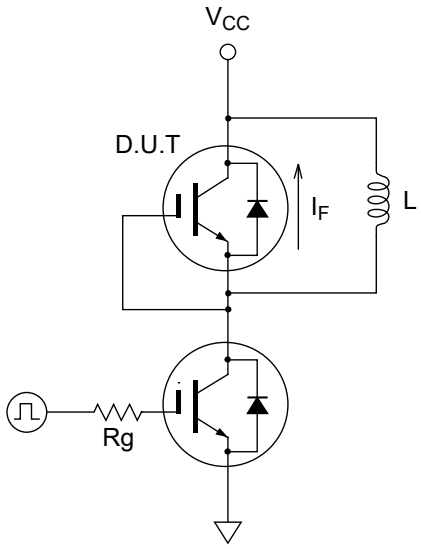
Switching Time Test Circuit



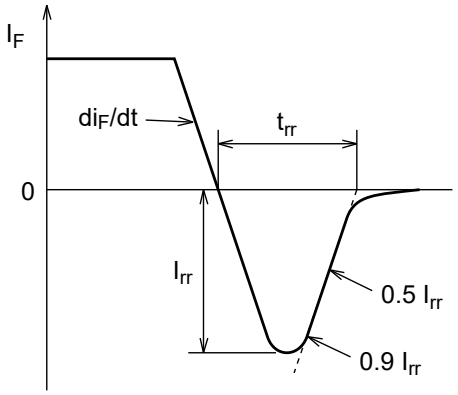
Waveform



Diode Reverse Recovery Time Test Circuit



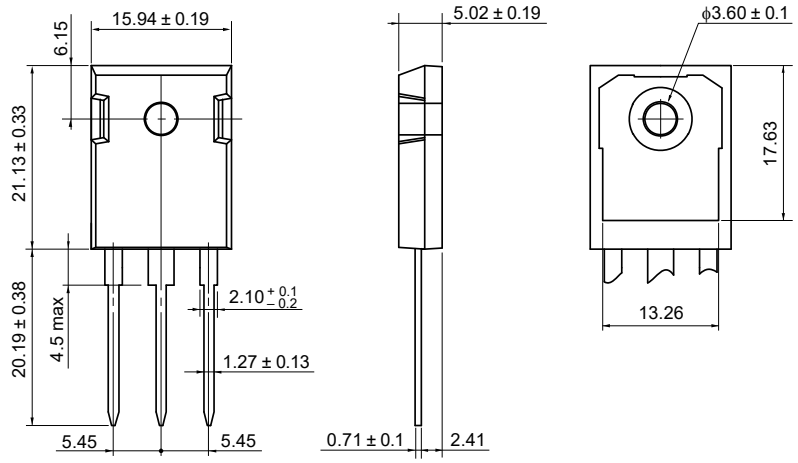
Waveform



Package Dimensions

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

Unit: mm



Ordering Information

Orderable Part Number	Quantity	Shipping Container
RBN40H125S1FPQ-A0#CB0	240 pcs	Box (Tube)

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