RJH1CV7DPQ-E0

1200V - 35A - IGBT
Application: Inverter

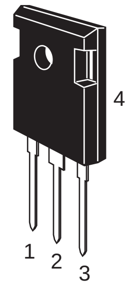
R07DS0525EJ0500
Rev.5.00
May 24, 2012

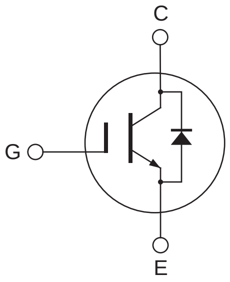
Features

- Short circuit withstand time (5 μs typ.)
- Low collector to emitter saturation voltage
  $V_{CE(sat)} = 1.8$ V typ. (at $I_C = 35$ A, $V_{GE} = 15$ V, Ta = 25°C)
- Built-in fast recovery diode ($t_{rr} = 200$ ns typ.) in one package
- Trench gate and thin wafer technology
- High speed switching
  $t_f = 280$ ns typ. (at $V_{CC} = 600$ V, $V_{GE} = 15$ V, $I_C = 35$ A, Rg = 5 Ω, Ta = 25°C, inductive load)

Outline

RENESAS Package code: PRSS0003ZE-A
(Package name: TO-247)





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

Absolute Maximum Ratings

(Ta = 25°C)

Item		Symbol	Ratings	Unit
Collector to emitter voltage / diode reverse voltage		V_{CES} / V_R	1200	V
Gate to emitter voltage		V_{GES}	±30	V
Collector current	Tc = 25℃	I_C	70	A
	Tc = 100℃	I_C	35	A
Collector peak current		ic(peak) [Note1]	105	A
Collector to emitter diode forward current		I_{DF}	35	A
Collector to emitter diode forward peak current		i_{DF}(peak) [Note1]	105	A
Collector dissipation		P_C [Note2]	320	W
Junction to case thermal resistance (IGBT)		θj-c [Note2]	0.39	℃/W
Junction to case thermal resistance (Diode)		θj-cd [Note2]	0.69	℃/W
Junction temperature		Tj	150	℃
Storage temperature		Tstg	–55 to +150	℃

Notes: 1. PW ≤ 10 μs, duty cycle ≤ 1%
2. Value at Tc = 25°C

Electrical Characteristics

(Ta = 25°C)

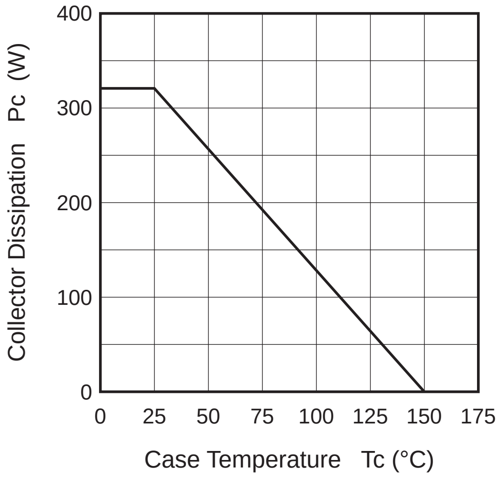
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Collector to emitter breakdown voltage	$V_{(BR)CES}$	1200	—	—	V	I_C =10 μA, V_{GE} = 0
Zero gate voltage collector current / Diode reverse current	I_{CES} /I_R	—	—	5	μA	V_{CE} = 1200 V, V_{GE} = 0
Gate to emitter leak current	I_{GES}	—	—	±1	μA	V_{GE} = ±30 V, V_{CE} = 0
Gate to emitter cutoff voltage	$V_{GE(off)}$	4.5	—	6.5	V	V_{CE} = 10 V, I_C = 1 mA
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	1.8	2.3	V	I_C = 35 A, V_{GE} = 15 V [Note3]
	$V_{CE(sat)}$	—	2.5	—	V	I_C = 70 A, V_{GE} = 15 V [Note3]
Input capacitance	Cies	—	2075	—	pF	V_{CE} = 25 V V_{GE} = 0 f = 1 MHz
Output capacitance	Coes	—	100	—	pF	
Reverse transfer capacitance	Cres	—	55	—	pF	
Total gate charge	Qg	—	166	—	nC	V_{GE} = 15 V V_{CE} = 300 V I_C = 35 A
Gate to emitter charge	Qge	—	20	—	nC	
Gate to collector charge	Qgc	—	95	—	nC	
Turn-on delay time	$t_{d(on)}$	—	53	—	ns	V_{CC} = 600 V V_{GE} = 15 V I_C = 35 A Rg = 5 Ω Inductive load
Rise time	t_r	—	45	—	ns	
Turn-off delay time	$t_{d(off)}$	—	185	—	ns	
Fall time	t_f	—	280	—	ns	
Turn-on energy	E_{on}	—	3.2	—	mJ	
Turn-off energy	E_{off}	—	2.5	—	mJ	
Total switching energy	E_{total}	—	5.7	—	mJ	
Short circuit withstand time	t_{sc}	—	5	—	μs	V_{CC} ≤ 720 V, V_{GE} = 15 V Tc ≤ 125°C

FRD forward voltage	V_F	—	2.1	—	V	I_F = 35 A [Note3]
FRD reverse recovery time	t_{rr}	—	200	—	ns	I_F = 35 A di_F/dt = 100 A/μs
FRD reverse recovery charge	Q_{rr}	—	0.7	—	μC	
FRD peak reverse recovery current	I_{rr}	—	9.6	—	A	

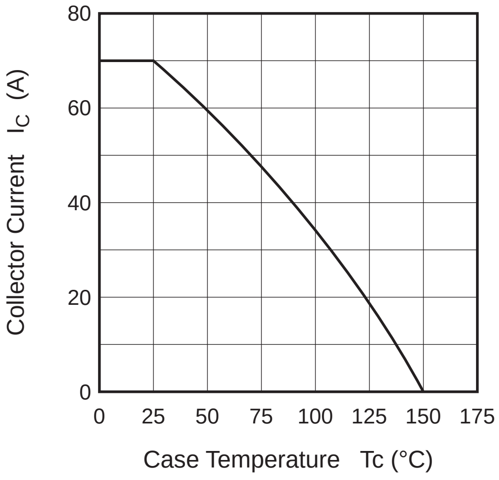
Notes: 3. Pulse test.

Main Characteristics

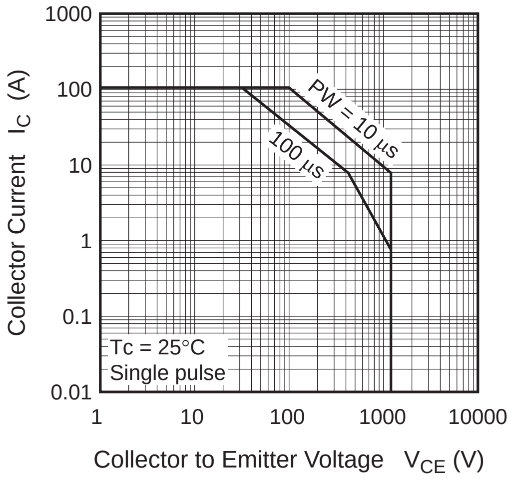
Collector Dissipation vs.
Case Temperature



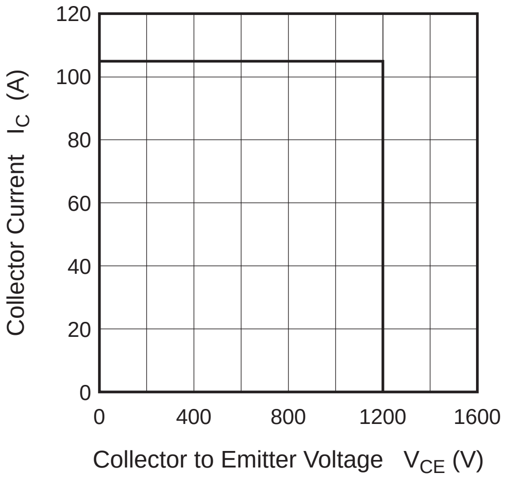
Maximum DC Collector Current vs.
Case Temperature



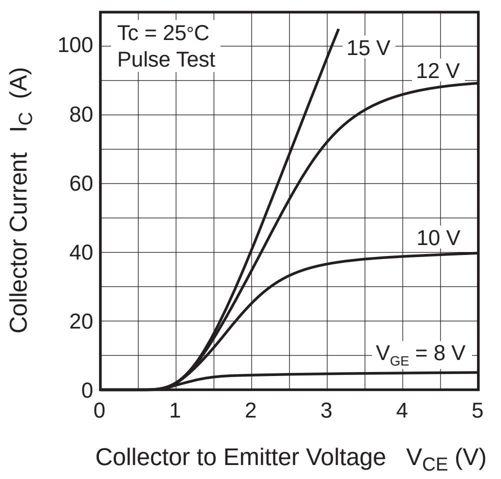
Maximum Safe Operation Area



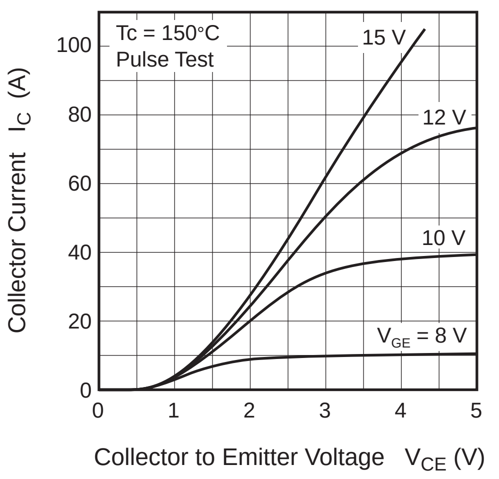
Turn-off SOA



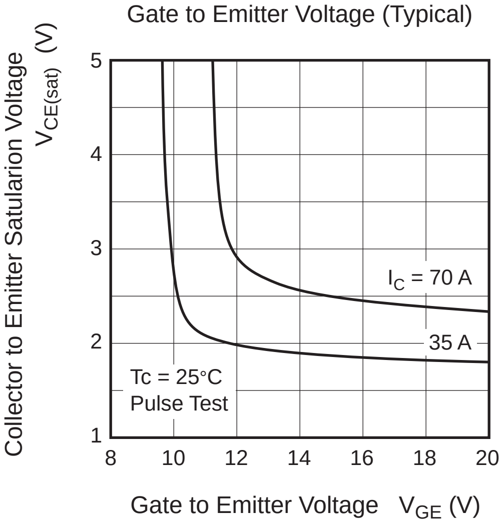
Typical Output Characteristics



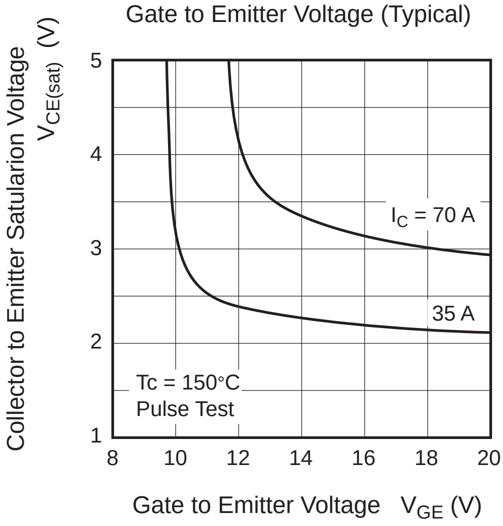
Typical Output Characteristics



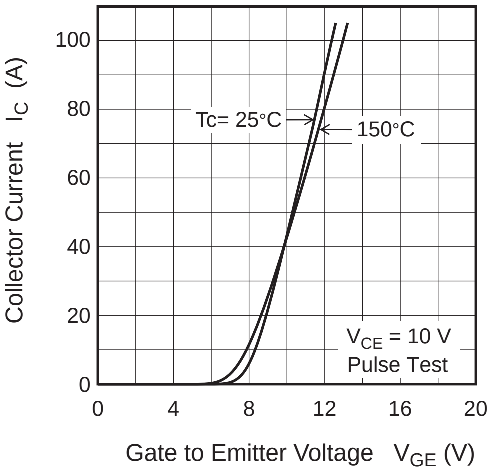
Collector to Emitter Satularion Voltage vs. Gate to Emitter Voltage (Typical)



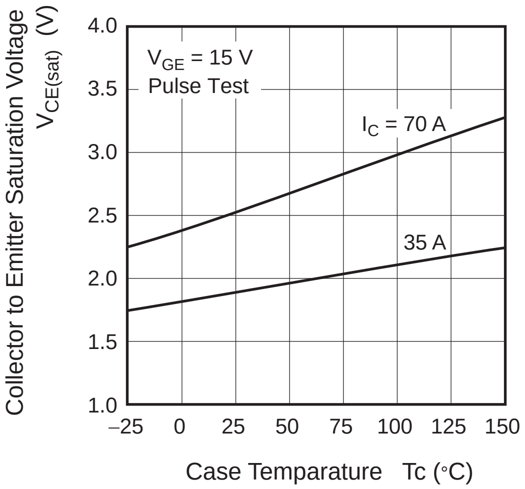
Collector to Emitter Satularion Voltage vs. Gate to Emitter Voltage (Typical)



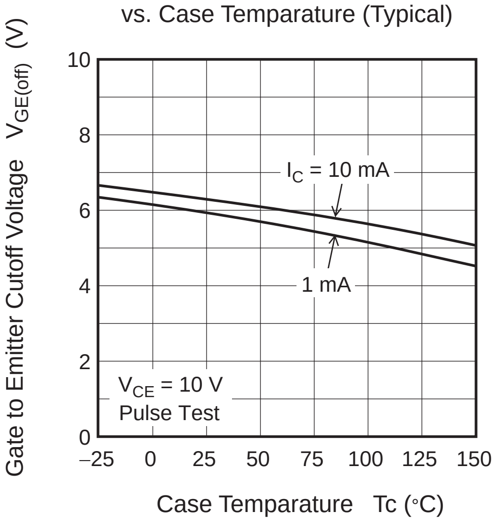
Typical Transfer Characteristics



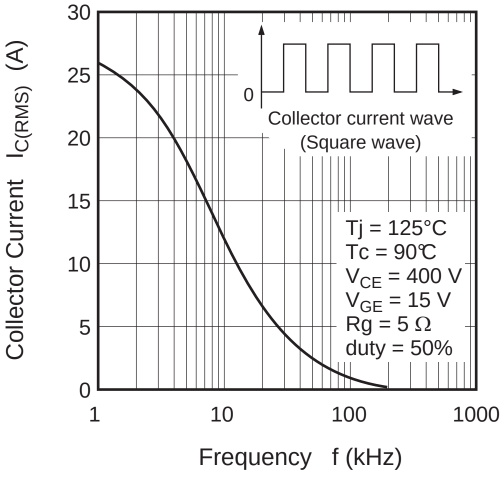
Collector to Emitter Saturation Voltage vs. Case Temparature (Typical)



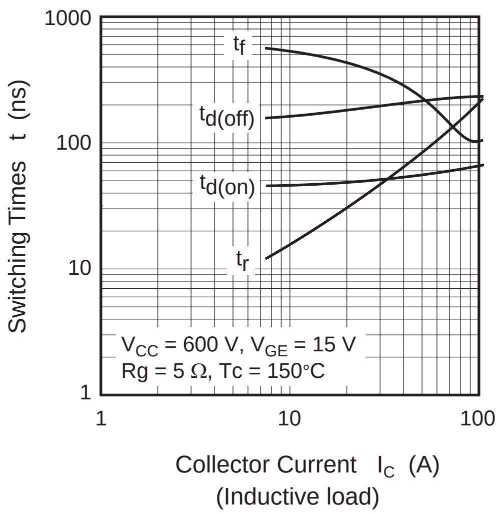
Gate to Emitter Cutoff Voltage vs. Case Temparature (Typical)



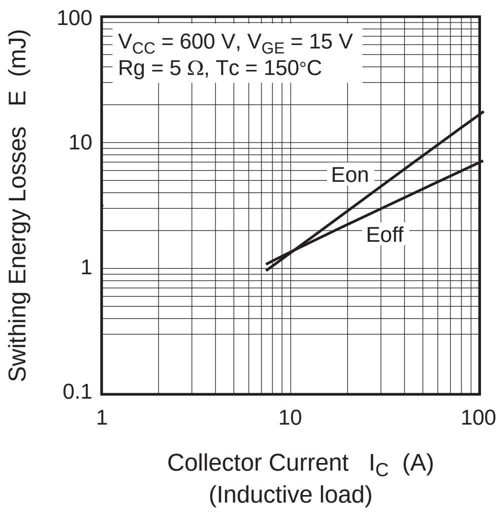
Frequency Characteristics (Typical)



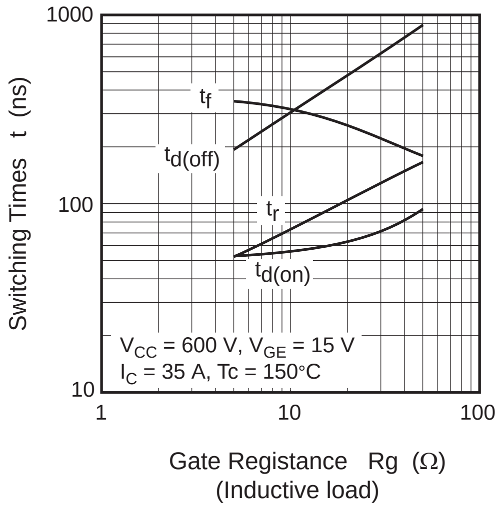
Switching Characteristics (Typical) (1)



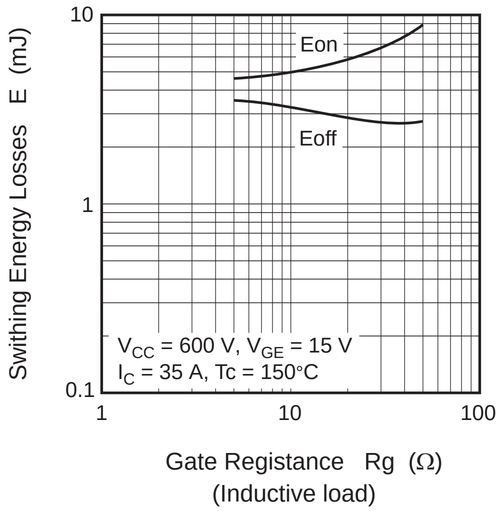
Switching Characteristics (Typical) (2)



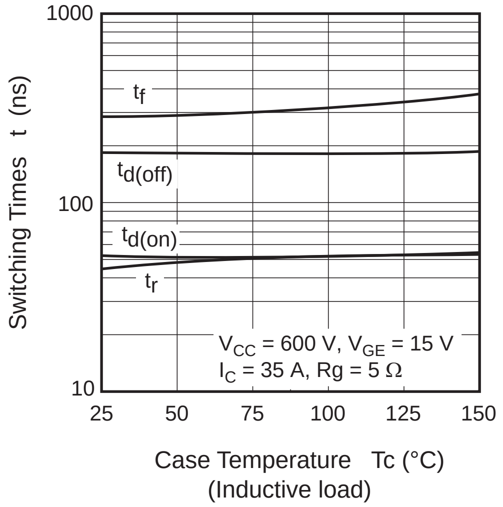
Switching Characteristics (Typical) (3)



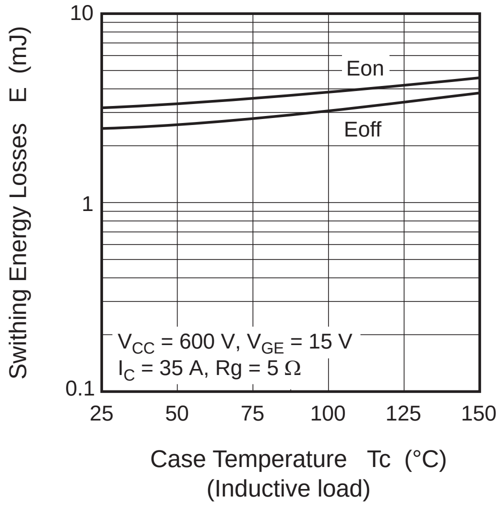
Switching Characteristics (Typical) (4)



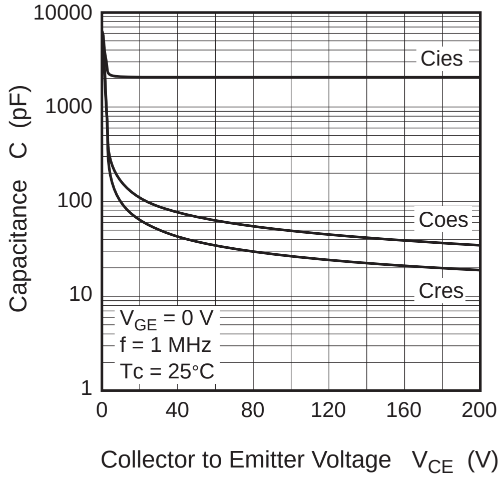
Switching Characteristics (Typical) (5)



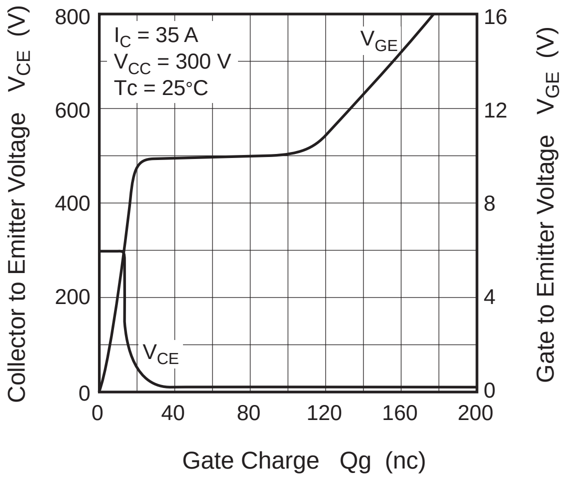
Switching Characteristics (Typical) (6)



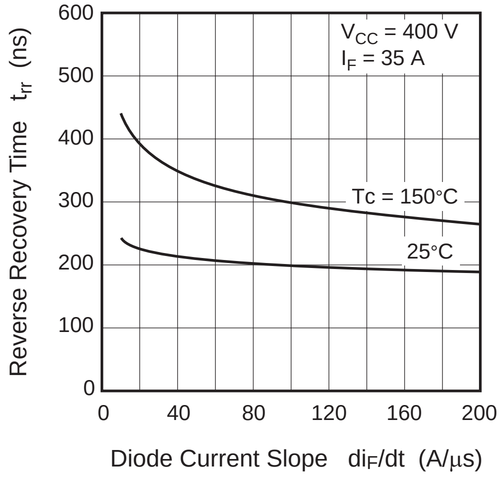
Typical Capacitance vs.
Collector to Emitter Voltage



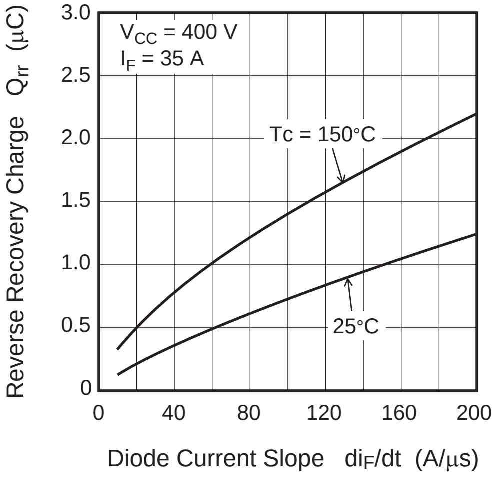
Dynamic Input Characteristics (Typical)



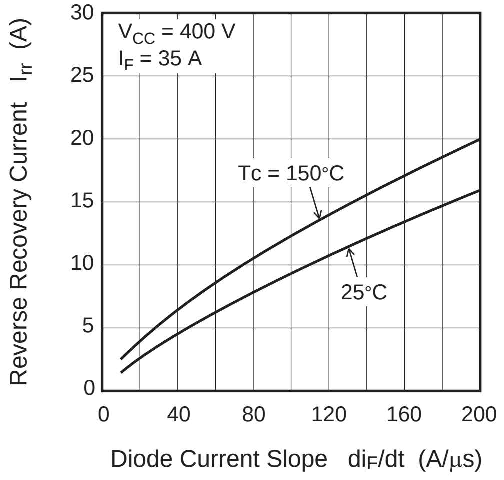
Reverse Recovery Time vs.
Diode Current Slope (Typical)



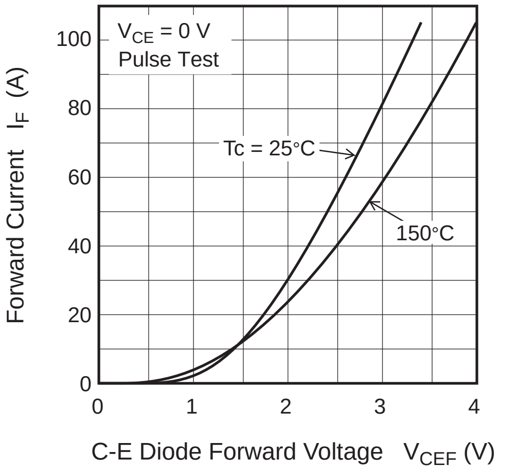
Reverse Recovery Charge vs.
Diode Current Slope (Typical)

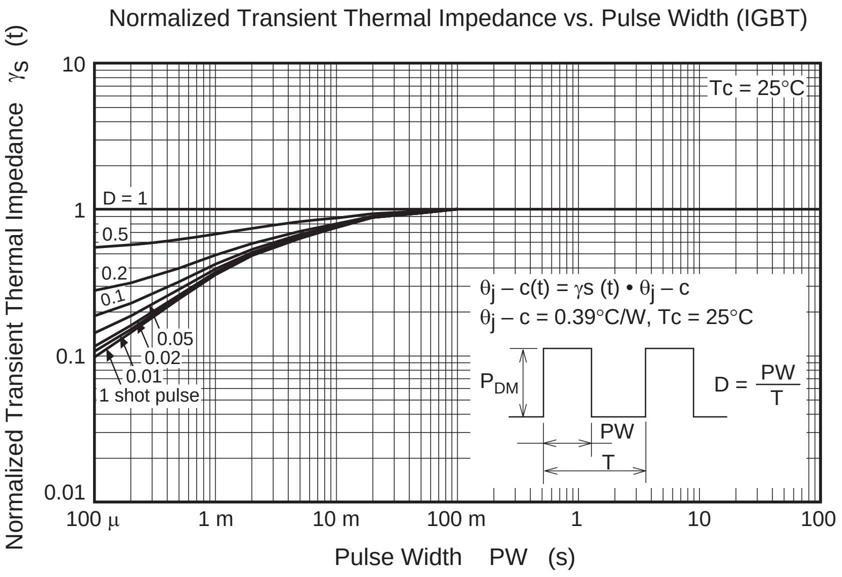


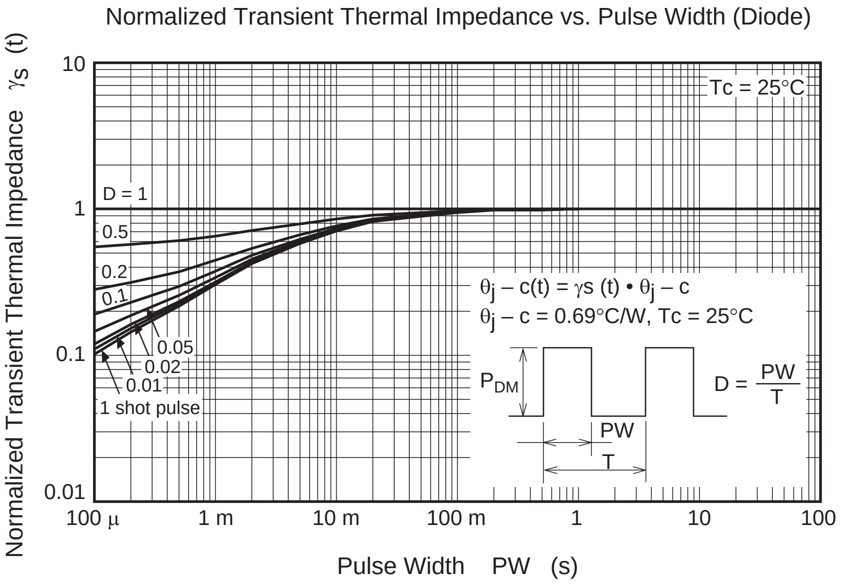
Reverse Recovery Current vs.
Diode Current Slope (Typical)



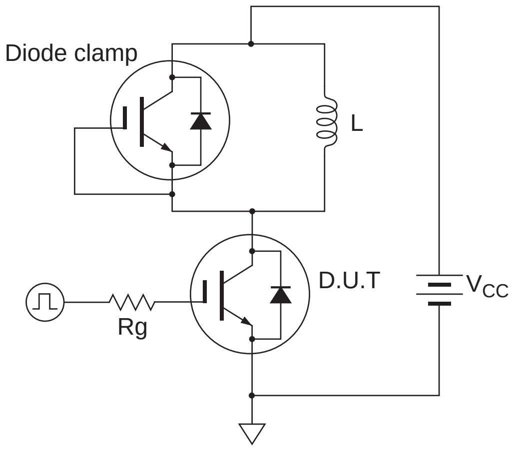
Forward Current vs. Forward Voltage (Typical)



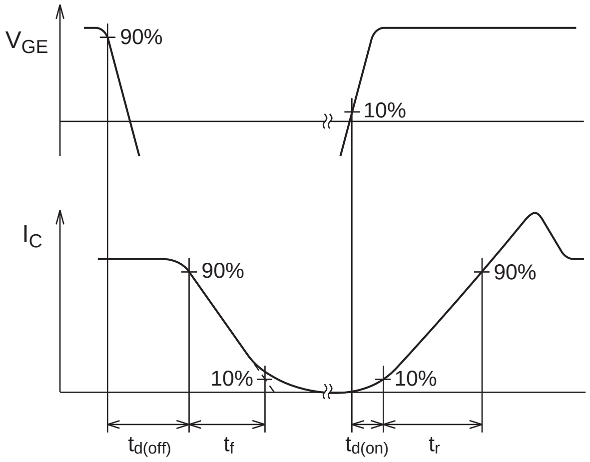

Normalized Transient Thermal Impedance vs. Pulse Width (IGBT)
Normalized Transient Thermal Impedance γS (t)
10
1
0.1
0.01
100 µ
1 m
10 m
100 m
1
10
100
Pulse Width PW (s)
Tc = 25°C
D = 1
0.5
0.2
0.1
0.05
0.02
0.01
1 shot pulse
θj – c(t) = γs (t) • θj – c
θj – c = 0.39°C/W, Tc = 25°C
PDM
D = PW / T
PW
T


Normalized Transient Thermal Impedance vs. Pulse Width (Diode)
Normalized Transient Thermal Impedance γS (t)
10
1
0.1
0.01
100 µ
1 m
10 m
100 m
1
10
100
Pulse Width PW (s)
Tc = 25°C
D = 1
0.5
0.2
0.1
0.05
0.02
0.01
1 shot pulse
θj – c(t) = γs (t) • θj – c
θj – c = 0.69°C/W, Tc = 25°C
PDM
D = PW / T
PW
T

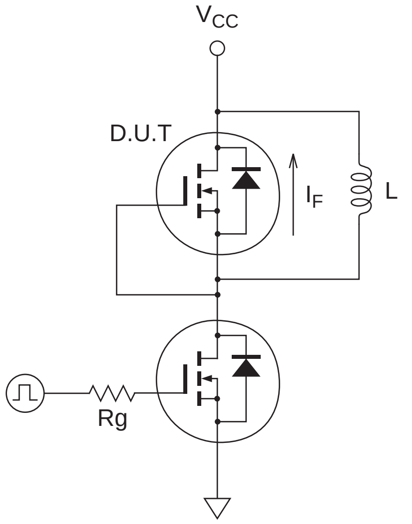
Switching Time Test Circuit



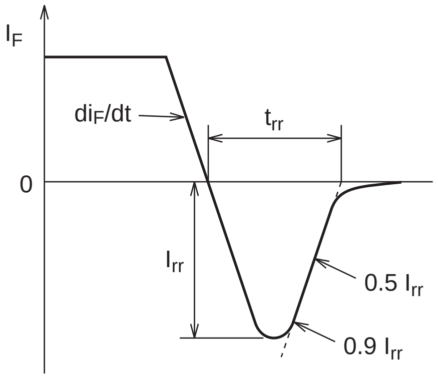
Waveform



Diode Reverse Recovery Time Test Circuit



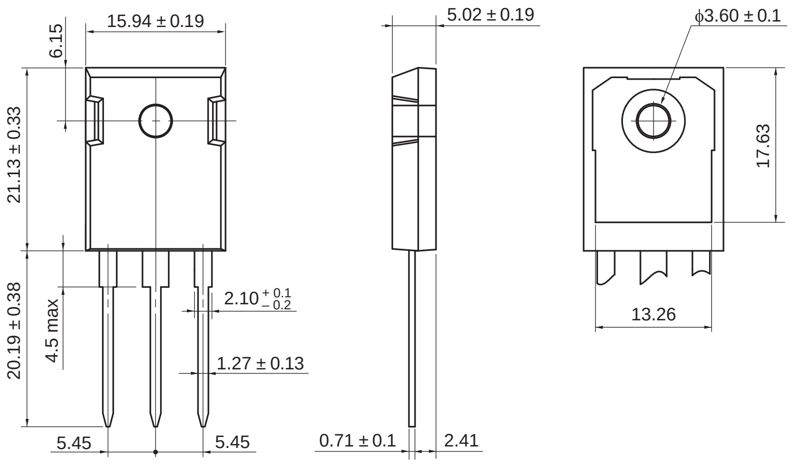
Waveform



Package Dimension

Package Name	JEITA Package Code	RENESAS Code	Previous Code	MASS[Typ.]
TO-247	—	PRSS0003ZE-A	—	6.0g

Unit: mm



Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJH1CV7DPQ-E0#T2	450 pcs	Box (Tube)

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Colophon 2.0