RJH60T04DPQ-A1

600V - 30A - IGBT
Application:Current resonance circuit

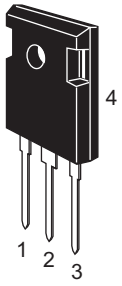
R07DS1191EJ0200
Rev.2.00
Apr 02, 2014

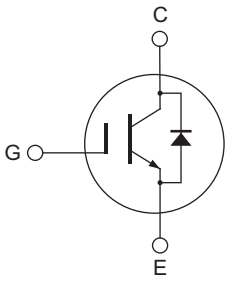
Features

- Optimized for current resonance application
- Low collector to emitter saturation voltage
  $V_{CE(sat)}$ = 1.5 V typ. (at I_C = 30 A, V_{GE} = 15 V, Ta = 25°C)
- Built in fast recovery diode in one package
- Trench gate and thin wafer technology
- High speed switching
  t_f = 45 ns typ. (at V_{CC} = 400 V, V_{GE} = 15 V , I_C = 30 A, Rg = 10 Ω, Ta = 25°C, Inductive load)
- Low tail loss
  E_{tail} = 160 µJ typ. (at V_{CC} = 300 V, V_{GE} = 20 V, I_C = 50 A, Rg = 15 Ω, Tc = 125°C, current resonance circuit)

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}	600	V
Gate to emitter voltage		V_{GES}	±30	V
Collector current	Tc = 25 °C	I_C Note1	60	A
	Tc = 100 °C	I_C Note1	30	A
Collector peak current		I_C(peak) Note1	180	A
Collector to emitter diode forward peak current		I_{DF}(peak) Note2	80	A
Collector dissipation		P_C	208.3	W
Junction to case thermal impedance (IGBT)		θj-c	0.6	°C/W
Junction to case thermal impedance (Diode)		θj-cd	2.1	°C/W
Junction temperature		Tj	150	°C
Storage temperature		Tstg	–55 to +150	°C

Notes: 1. Pulse width limited by safe operating area.
2. PW ≤ 5 µs, duty cycle ≤ 1%

Electrical Characteristics

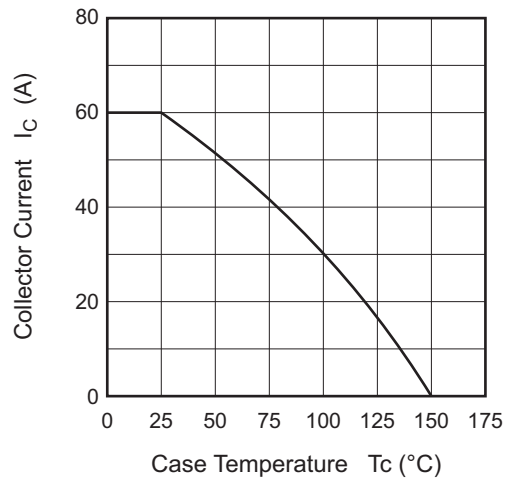
(Ta = 25°C)

Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero gate voltage collector current	I_{CES}	—	—	100	μA	V_{CE} = 600 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	—	8	V	V_{CE} = 10V, I_C = 1 mA
Collector to emitter saturation voltage	$V_{CE(sat)}$	—	1.50	1.95	V	I_C = 30 A, V_{GE} = 15V Note3
Input capacitance	Cies	—	1910	—	pF	V_{CE} = 25 V V_{GE} = 0 f = 1 MHz
Output capacitance	Coes	—	69	—	pF	
Reveres transfer capacitance	Cres	—	34	—	pF	
Total gate charge	Qg	—	87	—	nC	V_{GE} = 15 V V_{CE} = 300 V I_C = 30 A
Gate to emitter charge	Qge	—	18	—	nC	
Gate to collector charge	Qgc	—	41	—	nC	
Turn-on delay time	$t_{d(on)}$	—	54	—	ns	V_{CC} = 400 V V_{GE} = 15 V I_C = 30 A, Rg = 10 Ω Inductive load
Rise time	t_r	—	52	—	ns	
Turn-off delay time	$t_{d(off)}$	—	136	—	ns	
Fall time	t_f	—	45	—	ns	
Tail loss	E_{tail}	—	160	—	μJ	V_{CC} = 300 V, V_{GE} = 20 V I_C = 50 A, Rg = 15 Ω Tc = 125°C Current resonance circuit
C-E diode forward voltage	V_{ECF}	—	1.2	1.6	V	I_F = 20 A Note3
C-E diode reverse recovery time	t_{rr}	—	100	—	ns	I_F = 10 A di_F/dt = –100 A/μs

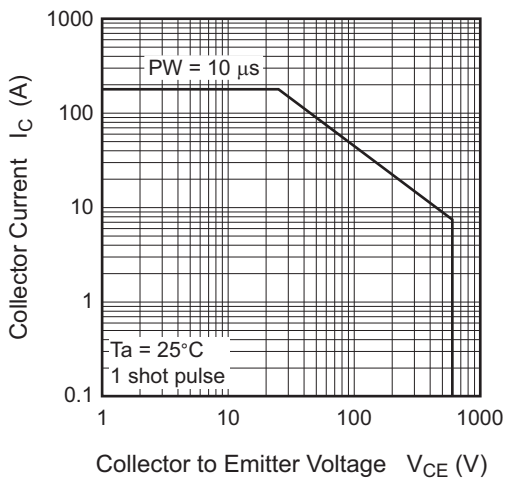
Notes: 3. Pulse test

Main Characteristics

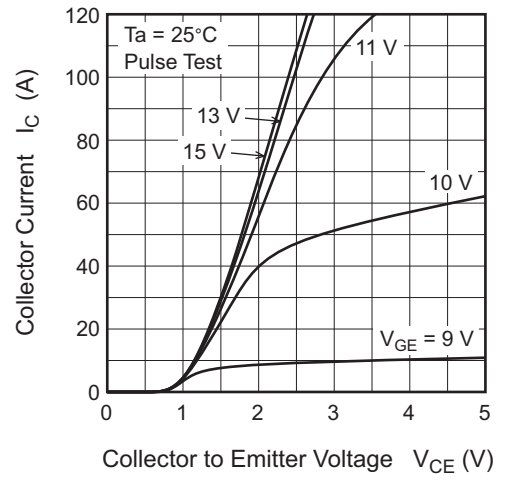
Maximum DC Collector Current vs. Case Temperature



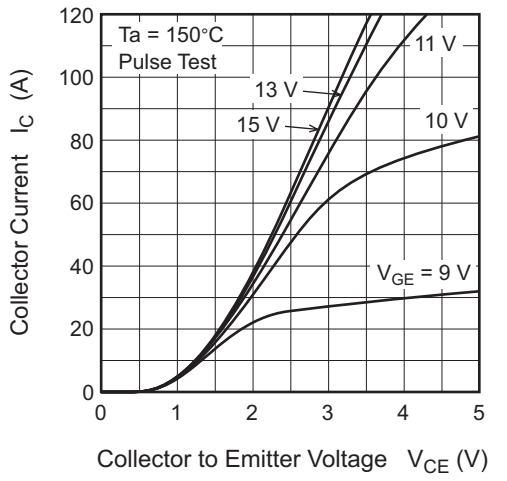
Maximum Safe Operation Area



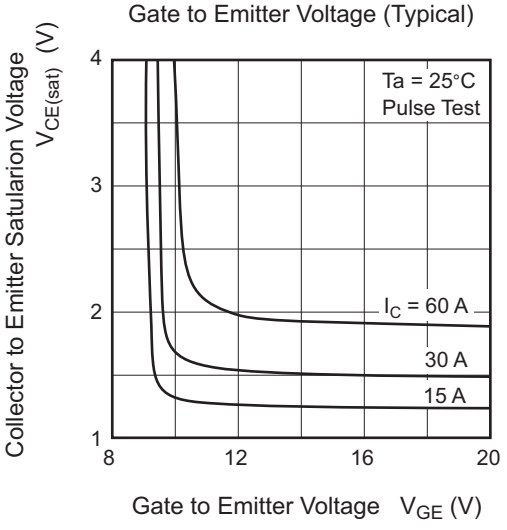
Typical Output Characteristics



Typical Output Characteristics



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



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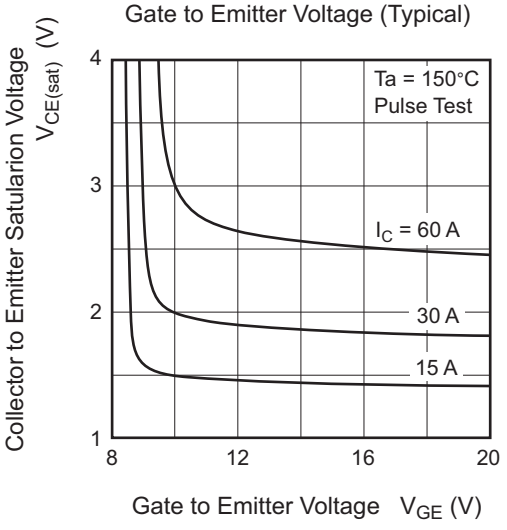
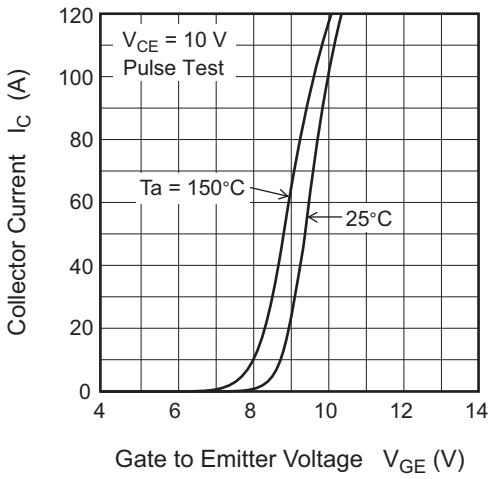
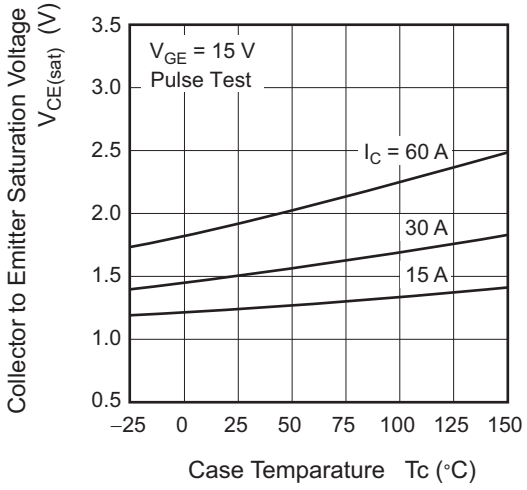


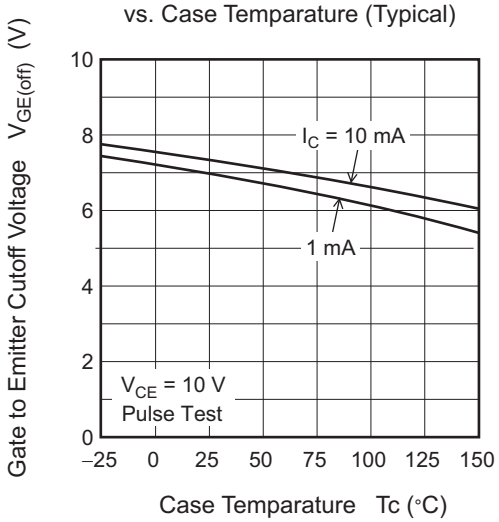
Transfer Characteristics (Typical)



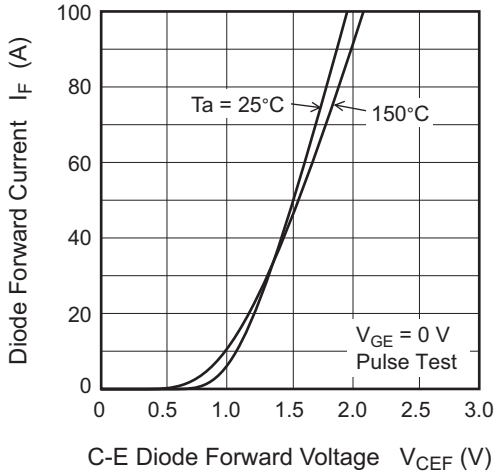
Collector to Emitter Saturation Voltage vs. Case Temparature (Typical)



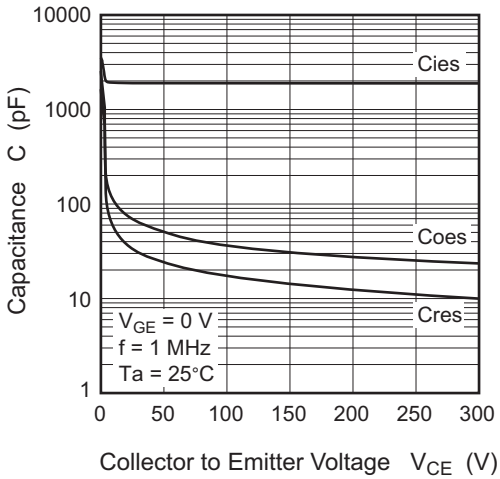
Gate to Emitter Cutoff Voltage vs. Case Temparature (Typical)



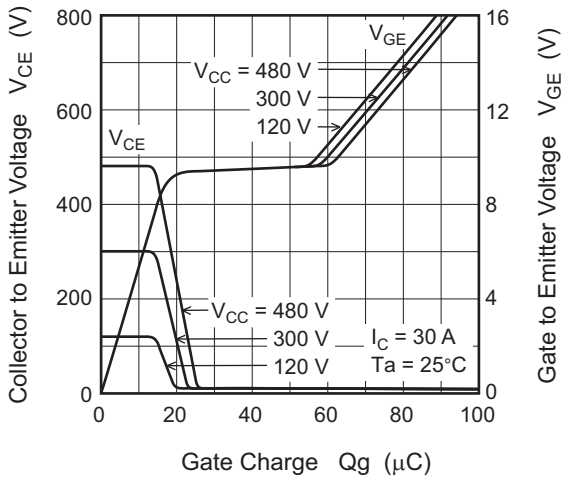
Forward Current vs. Forward Voltage (Typical)



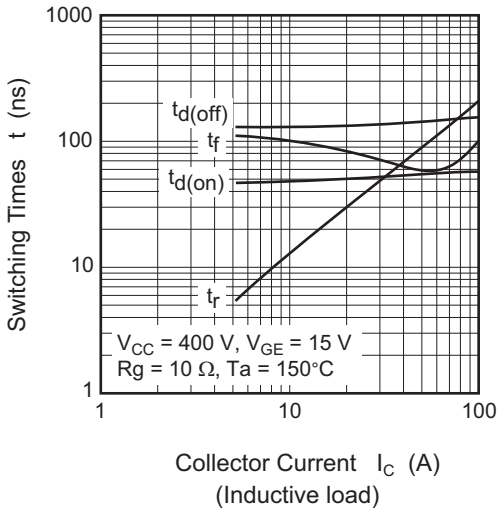
Typical Capacitance vs. Collector to Emitter Voltage



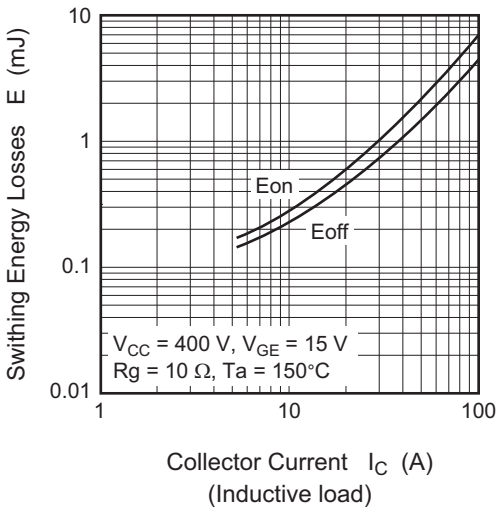
Dynamic Input Characteristics (Typical)



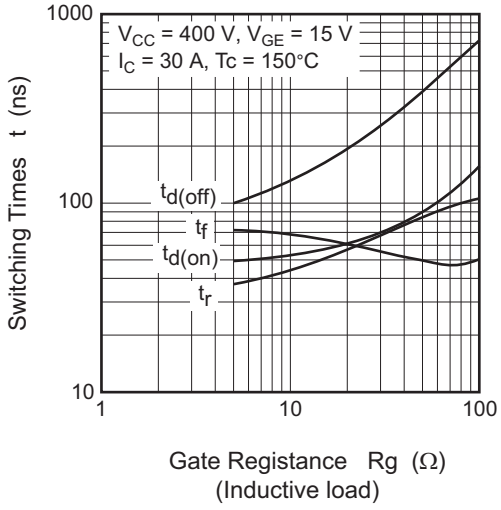
Switching Characteristics (Typical) (1)



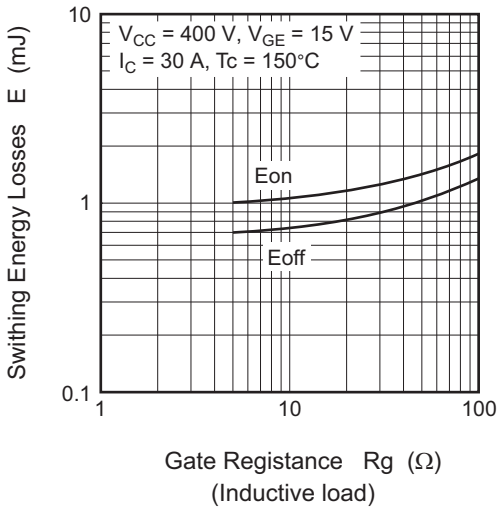
Switching Characteristics (Typical) (2)



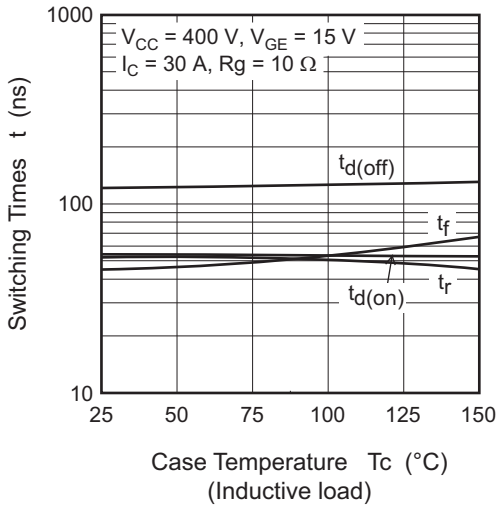
Switching Characteristics (Typical) (3)



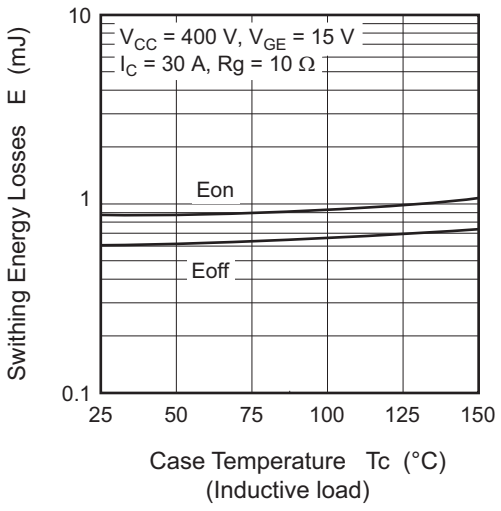
Switching Characteristics (Typical) (4)



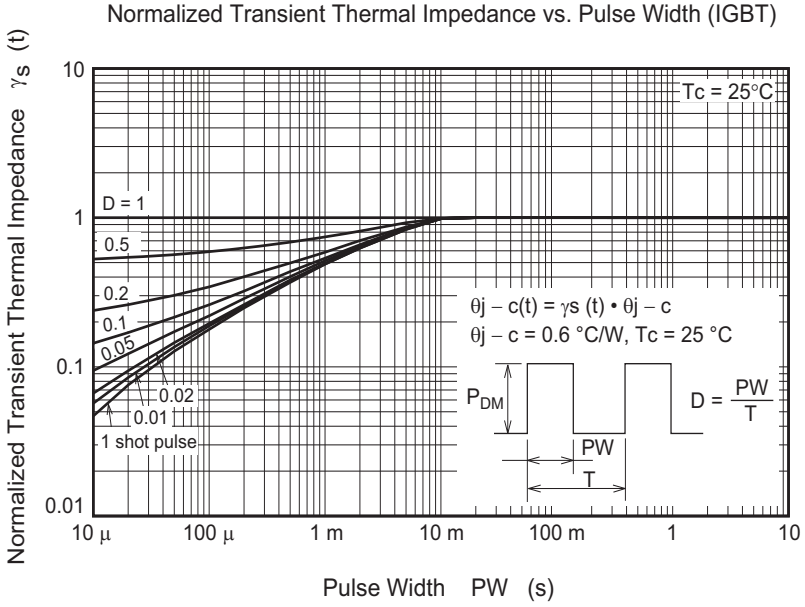
Switching Characteristics (Typical) (5)



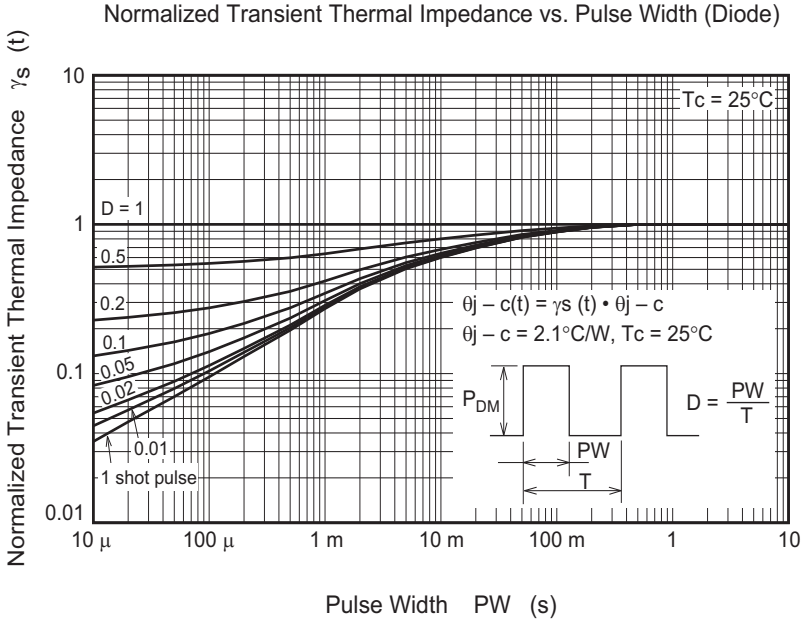
Switching Characteristics (Typical) (6)



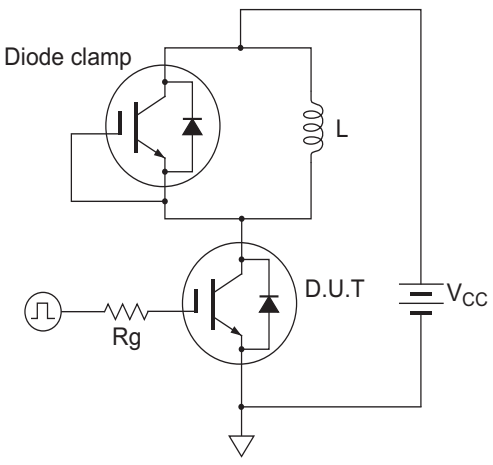
Normalized Transient Thermal Impedance vs. Pulse Width (IGBT)



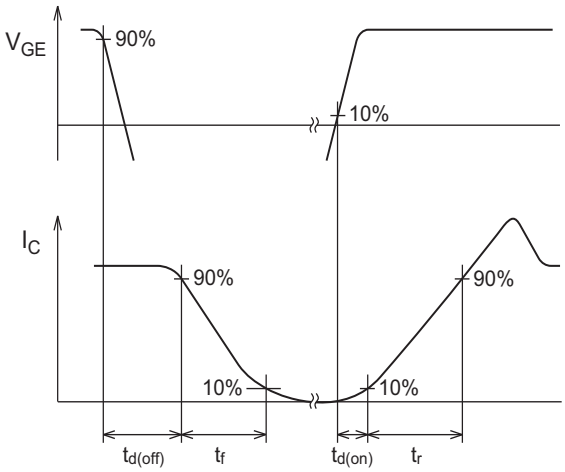
Normalized Transient Thermal Impedance vs. Pulse Width (Diode)



Switching Time Test Circuit



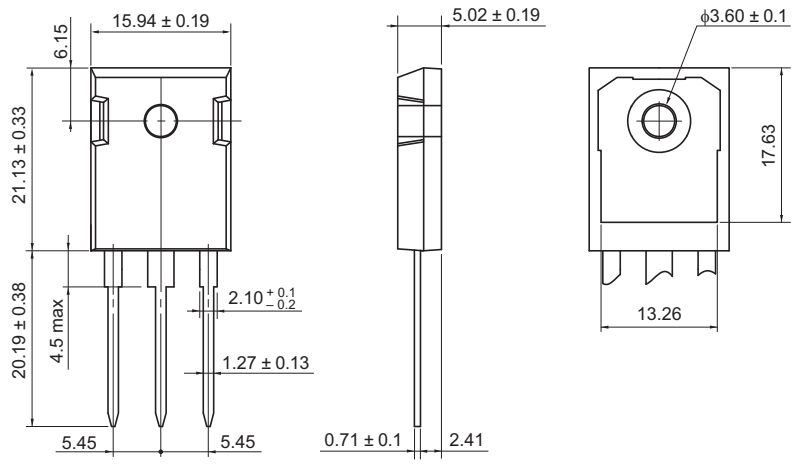
Waveform



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
RJH60T04DPQ-A1#T0	240 pcs	Box (Tube)

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