

# RJK60S5DPN

600V - 20A - MOS FET  
High Speed Power Switching

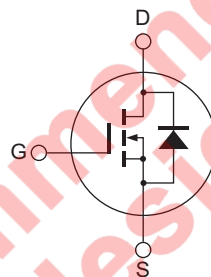
R07DS0952EJ0200  
Rev.2.00  
Jan 23, 2013

## Features

- Superjunction MOSFET
- Low on-resistance  
 $R_{DS(on)} = 0.150 \Omega$  typ. (at  $I_D = 10 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$ ,  $T_a = 25^\circ\text{C}$ )
- High speed switching  
 $t_f = 23 \text{ ns}$  typ. (at  $I_D = 10 \text{ A}$ ,  $V_{GS} = 10 \text{ V}$ ,  $R_L = 30 \Omega$ ,  $R_g = 10 \Omega$ ,  $T_a = 25^\circ\text{C}$ )

## Outline

RENESAS Package code: PRSS0004AC-A  
(Package name: TO-220AB)



1. Gate
2. Drain
3. Source

## Absolute Maximum Ratings

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

Item	Symbol	Ratings	Unit
Drain to source voltage	$V_{DSS}$	600	V
Gate to source voltage	$V_{GSS}$	+30, -20	V
Drain current	$I_D$ <sup>Note1</sup>	20	A
	$I_D$ <sup>Note1</sup>	12.6	A
Drain peak current	$I_{D(pulse)}$ <sup>Note1</sup>	40	A
Body-drain diode reverse drain current	$I_{DR}$ <sup>Note1</sup>	20	A
Body-drain diode reverse drain peak current	$I_{DR(pulse)}$ <sup>Note1</sup>	40	A
Avalanche current	$I_{AP}$ <sup>Note2</sup>	5	A
Avalanche energy	$E_{AR}$ <sup>Note2</sup>	1.36	mJ
MOSFET dv/dt ruggedness	$dv/dt$ <sup>Note3</sup>	150	V/ns
Channel dissipation	$P_{ch}$ <sup>Note2</sup>	166.6	W
Channel to case thermal impedance	$\theta_{ch-c}$	0.75	$^\circ\text{C/W}$
Channel temperature	$T_{ch}$	150	$^\circ\text{C}$
Storage temperature	$T_{stg}$	-55 to +150	$^\circ\text{C}$

- Notes: 1. Limited by  $T_{ch}$  max.  
2.  $ST_{ch} = 25^\circ\text{C}$ ,  $T_{ch} \leq 150^\circ\text{C}$   
3. Value at  $T_j = 25^\circ\text{C}$ ,  $V_{DS} \leq 480 \text{ V}$   
4. Value at  $T_c = 25^\circ\text{C}$

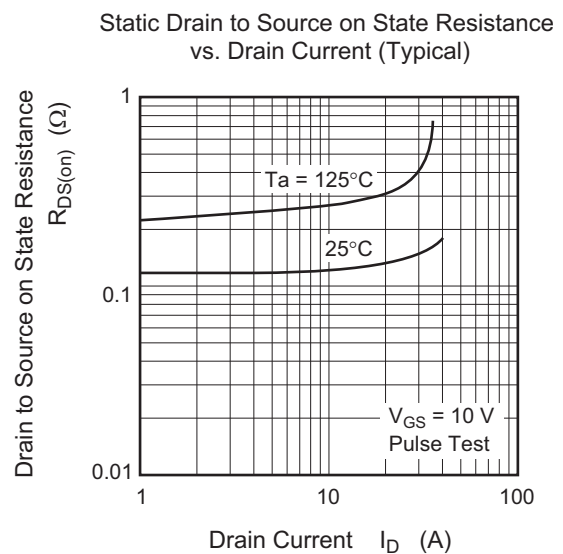
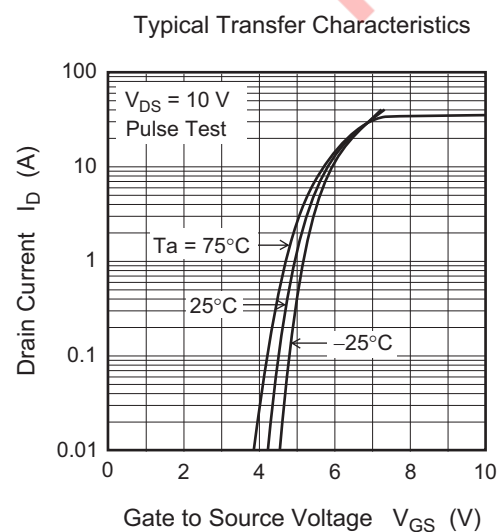
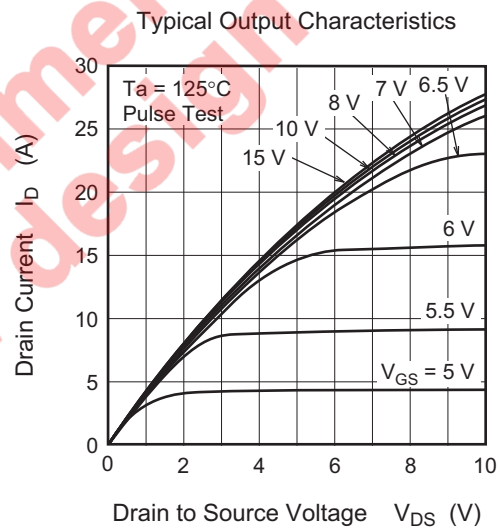
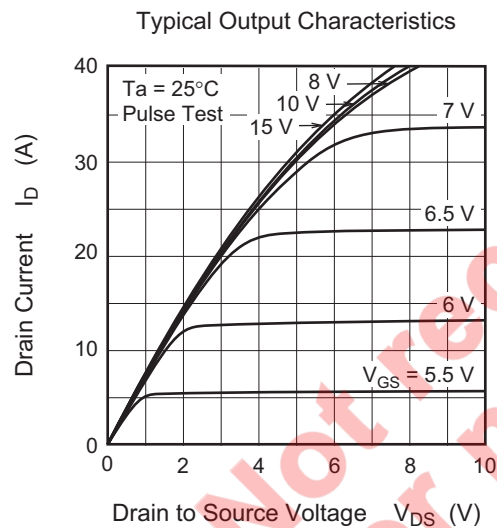
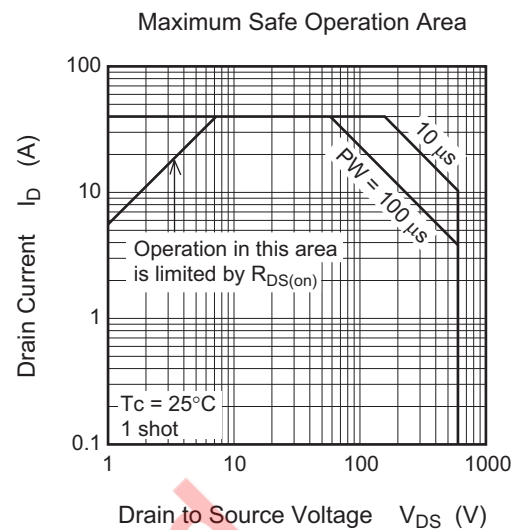
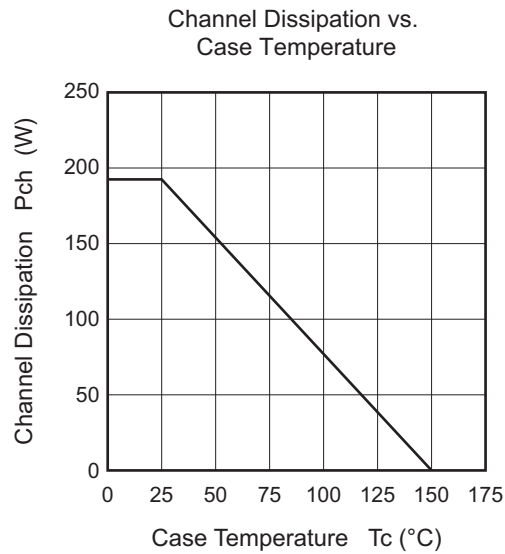
## Electrical Characteristics

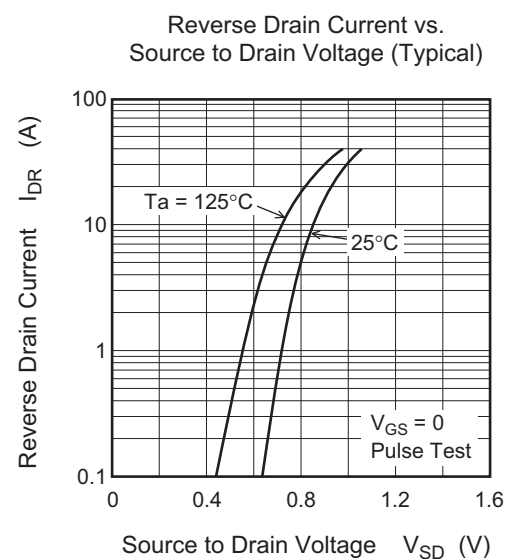
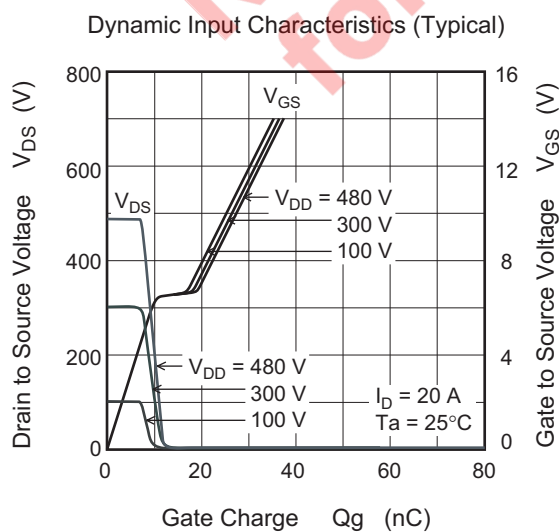
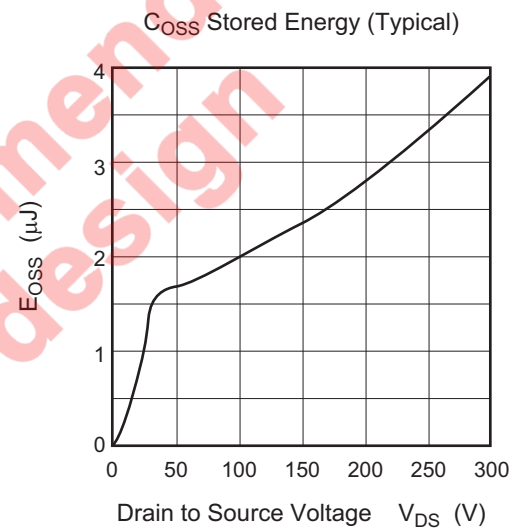
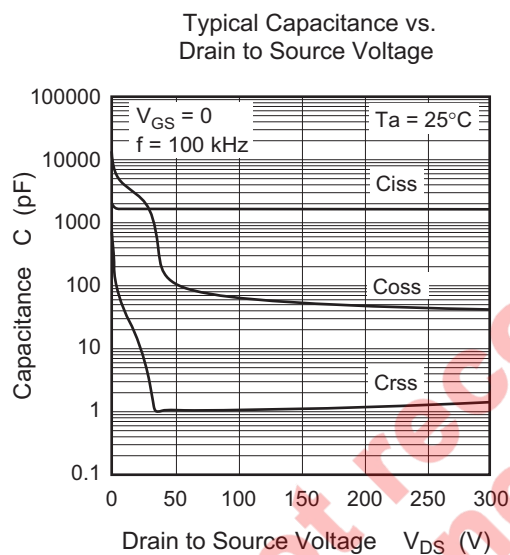
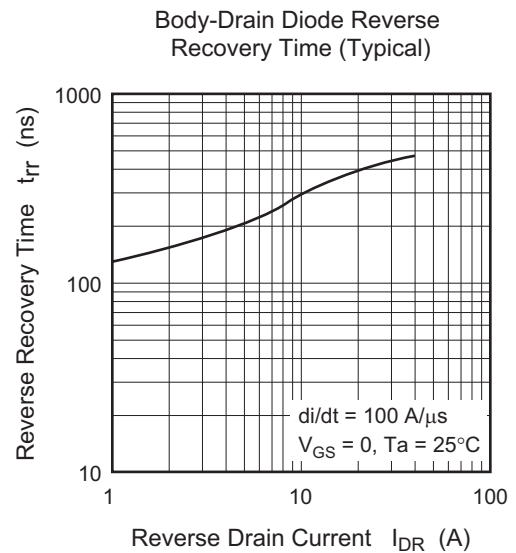
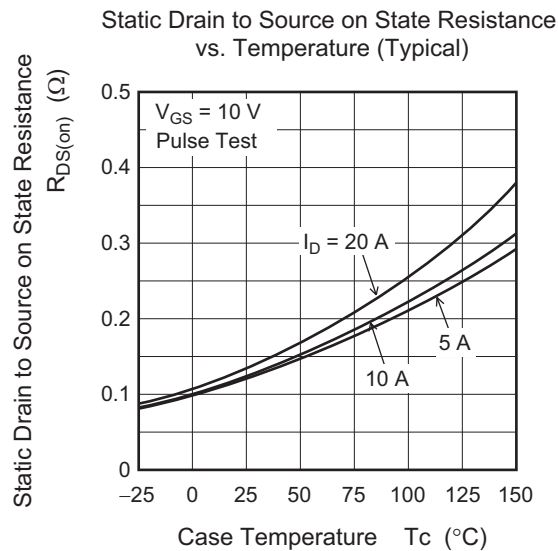
(Ta = 25°C)

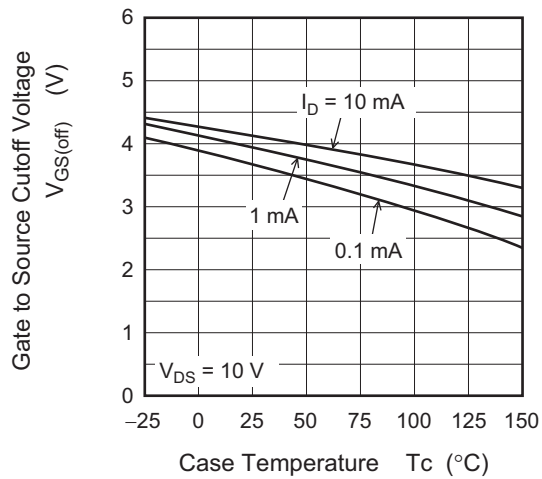
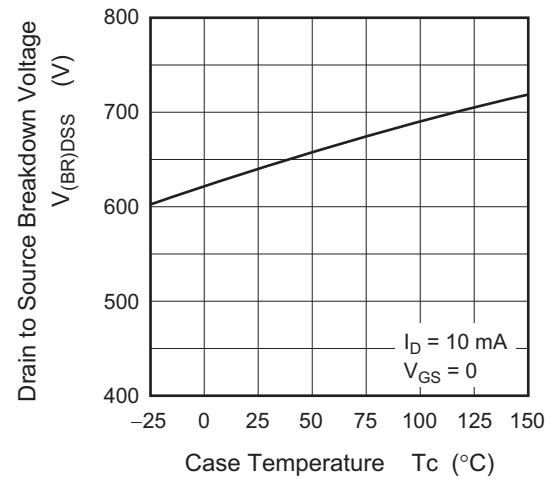
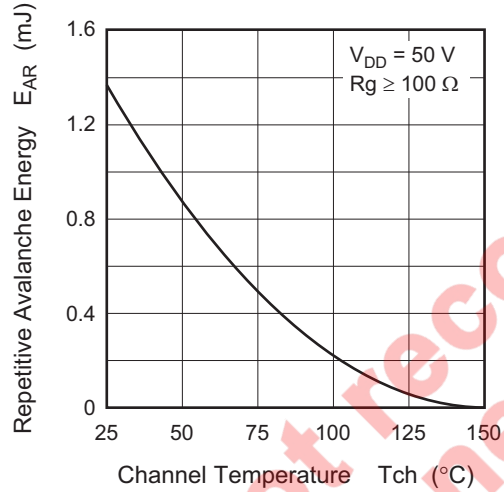
Item	Symbol	Min	Typ	Max	Unit	Test conditions
Drain to source breakdown voltage	$V_{(BR)DSS}$	600	—	—	V	$I_D = 10 \text{ mA}$ , $V_{GS} = 0$
Zero gate voltage drain current	$I_{DSS}$	—	—	1	mA	$V_{DS} = 600 \text{ V}$ , $V_{GS} = 0$
Gate to source leak current	$I_{GSS}$	—	—	$\pm 0.1$	$\mu\text{A}$	$V_{GS} = +30\text{V}$ , $-20 \text{ V}$ , $V_{DS} = 0$
Gate to source cutoff voltage	$V_{GS(off)}$	3	—	5	V	$V_{DS} = 10 \text{ V}$ , $I_D = 1 \text{ mA}$
Static drain to source on state resistance	$R_{DS(on)}$	—	0.150	0.178	$\Omega$	$I_D = 10 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note5</sup>
	$R_{DS(on)}$	—	0.375	—	$\Omega$	Ta = 150°C $I_D = 10 \text{ A}$ , $V_{GS} = 10 \text{ V}$ <sup>Note5</sup>
Gate resistance	Rg	—	2.5	—	$\Omega$	f = 1 MHz $V_{DS} = 25 \text{ V}$ , $V_{GS} = 0$
Input capacitance	Ciss	—	1600	—	pF	$V_{DS} = 25 \text{ V}$
Output capacitance	Coss	—	2160	—	pF	$V_{GS} = 0$
Reverse transfer capacitance	Crss	—	8.2	—	pF	f = 100kHz
Turn-on delay time	$t_{d(on)}$	—	23	—	ns	$I_D = 10 \text{ A}$
Rise time	$t_r$	—	25	—	ns	$V_{GS} = 10 \text{ V}$
Turn-off delay time	$t_{d(off)}$	—	49	—	ns	$R_L = 30 \Omega$
Fall time	$t_f$	—	23	—	ns	$R_g = 10 \Omega$ <sup>Note5</sup>
Total gate charge	Qg	—	27	—	nC	$V_{DD} = 480 \text{ V}$
Gate to source charge	Qgs	—	10.5	—	nC	$V_{GS} = 10 \text{ V}$
Gate to drain charge	Qgd	—	8.5	—	nC	$I_D = 20 \text{ A}$ <sup>Note4</sup>
Body-drain diode forward voltage	$V_{DF}$	—	0.96	1.60	V	$I_F = 20 \text{ A}$ , $V_{GS} = 0$ <sup>Note5</sup>
Body-drain diode reverse recovery time	$t_{rr}$	—	400	—	ns	$I_F = 20 \text{ A}$
Body-drain diode reverse recovery current	$I_{rr}$	—	25	—	A	$V_{GS} = 0$
Body-drain diode reverse recovery charge	$Q_{rr}$	—	5.6	—	$\mu\text{C}$	$di_F/dt = 100 \text{ A}/\mu\text{s}$ <sup>Note5</sup>

Notes: 5. Pulse test

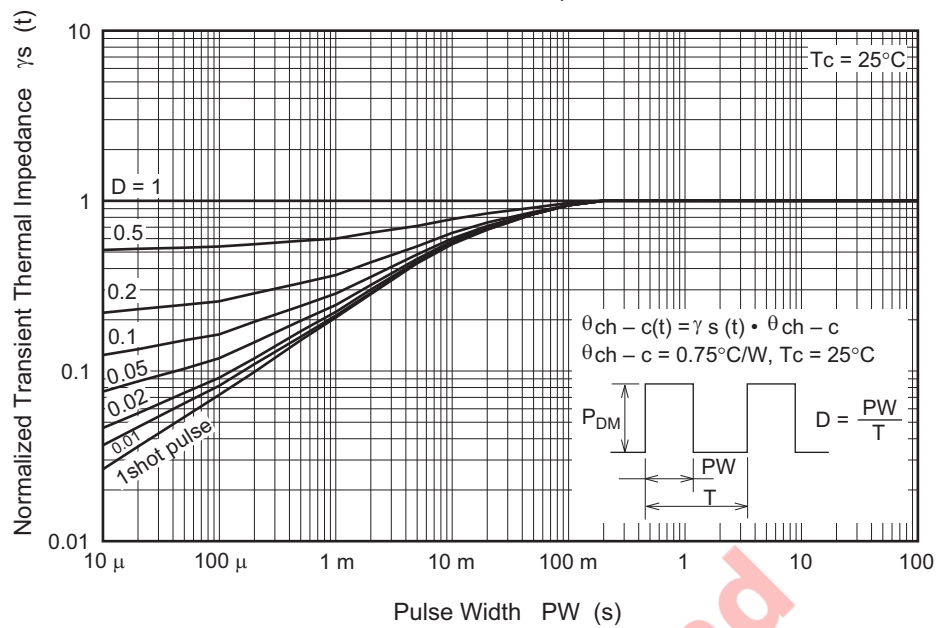
## Main Characteristics



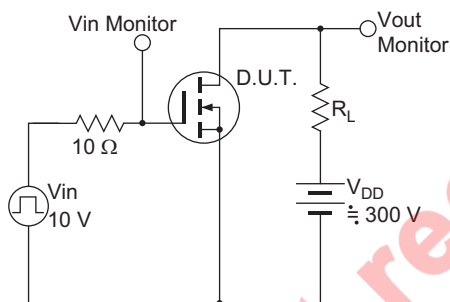


Gate to Source Cutoff Voltage  
vs. Case Temperature (Typical)Drain to Source Breakdown Voltage  
vs. Case Temperature (Typical)Maximum Avalanche Energy vs.  
Channel Temperature Derating

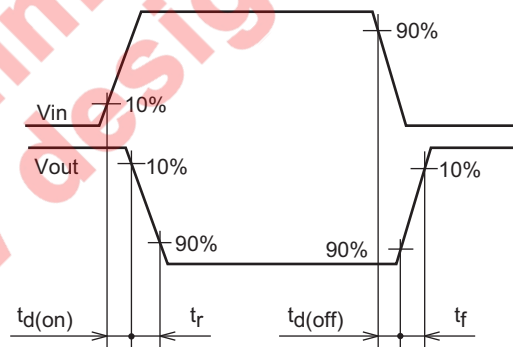
Normalized Transient Thermal Impedance vs. Pulse Width



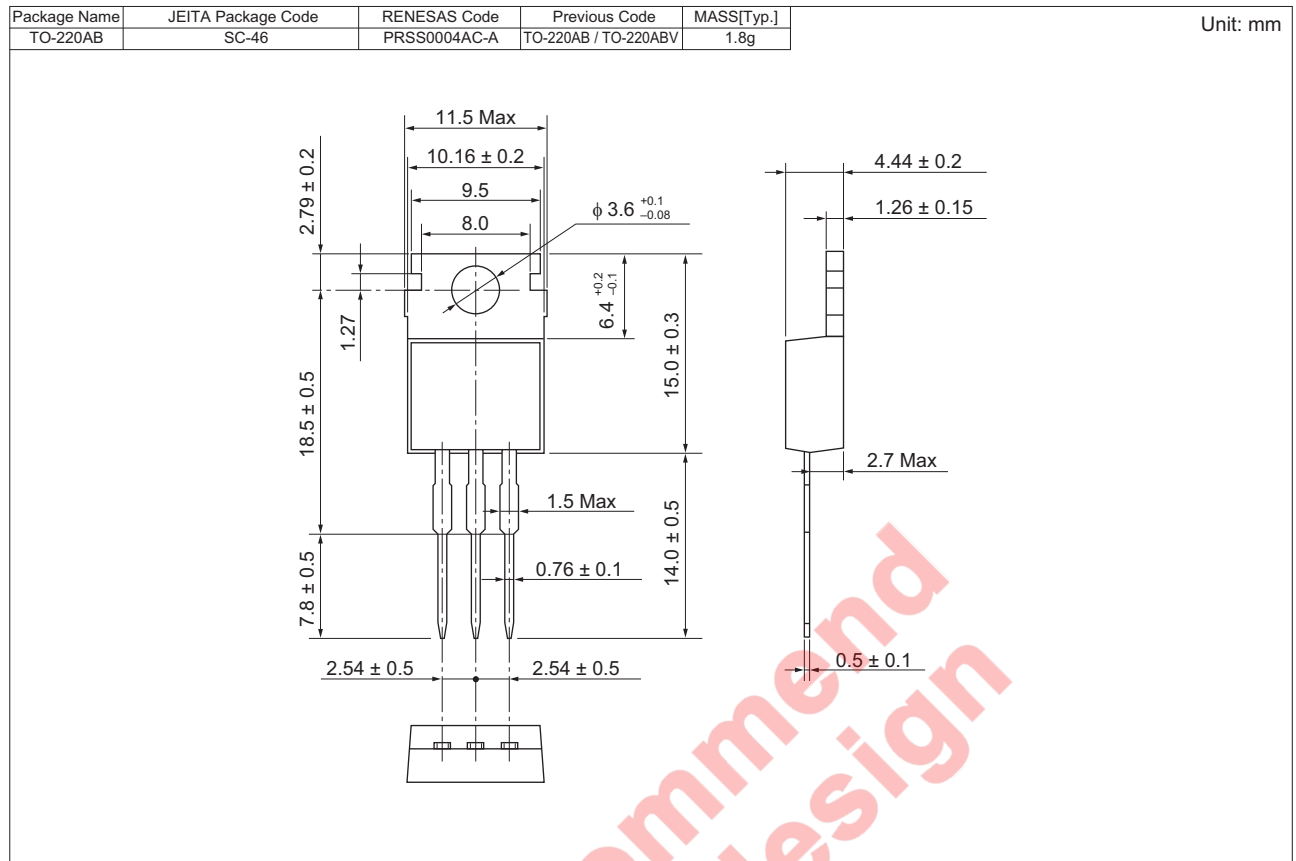
Switching Time Test Circuit



Waveform



## Package Dimension



## Ordering Information

Orderable Part Number	Quantity	Shipping Container
RJK60S5DPN-00#T2	50 pcs	Tube

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