

N0606N

N-channel MOSFET

60 V, 60 A, 12.9 mΩ

R07DS1316EJ0100

Rev.1.00

2019.9.30

Features

- Low on-state resistance : $R_{DS(on)} = 12.9 \text{ m}\Omega$ max. ($V_{GS} = 10 \text{ V}$, $I_D = 30 \text{ A}$)
- Low C_{iss} : $C_{iss} = 2170 \text{ pF}$ typ. ($V_{DS} = 25 \text{ V}$)
- High current : $I_{D(DC)} = \pm 60 \text{ A}$
- RoHS Compliant
- Quality Grade : Standard
- Applications : For high current switching

Ordering Information

Orderable Part Number	Package	Packing
N0606N-S19-AY	TO-220AB, Pb-free ^{Note1}	50 pcs / Magazine (Tube)

Note: 1. Pb-free means that this product does not contain lead in the external electrode.

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	60	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 60	A
Drain Current (pulse) ^{Note2}	$I_{D(pulse)}$	± 120	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	74.4	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	1.5	W
Channel Temperature	T_{ch}	150	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to 150	$^\circ\text{C}$
Single Avalanche Current ^{Note3}	I_{AS}	23	A
Single Avalanche Energy ^{Note3}	E_{AS}	54	mJ

Note: Continuous heavy condition (e.g. high temperature/voltage/current or high variation of temperature) may affect a reliability even if it is 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.

Notes: 2. $PW \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

3. Starting $T_{ch} = 25^\circ\text{C}$, $V_{DD} = 30 \text{ V}$, $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$, $L = 100 \mu\text{H}$

Thermal Resistance

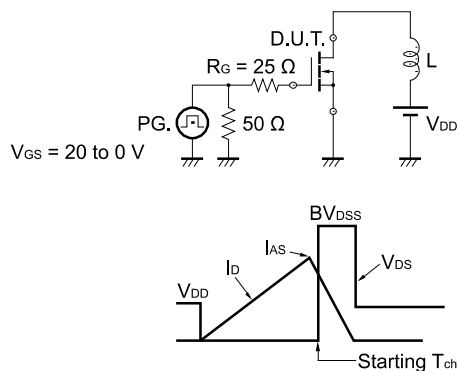
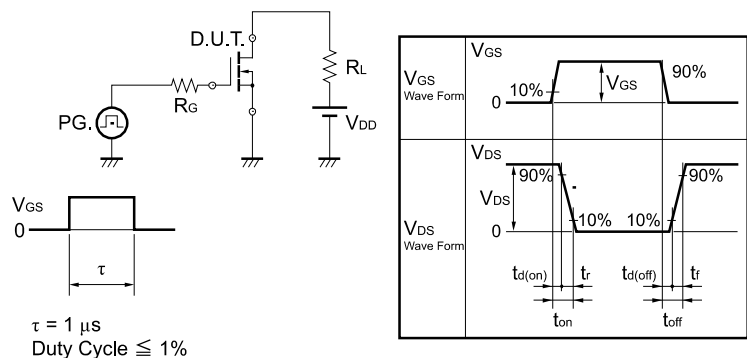
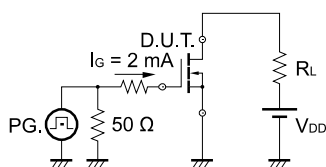
Item	Symbol	Max. Value ^{Note4}	Unit
Channel to Case Thermal Resistance	$R_{th(ch-C)}$	1.68	$^\circ\text{C/W}$
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

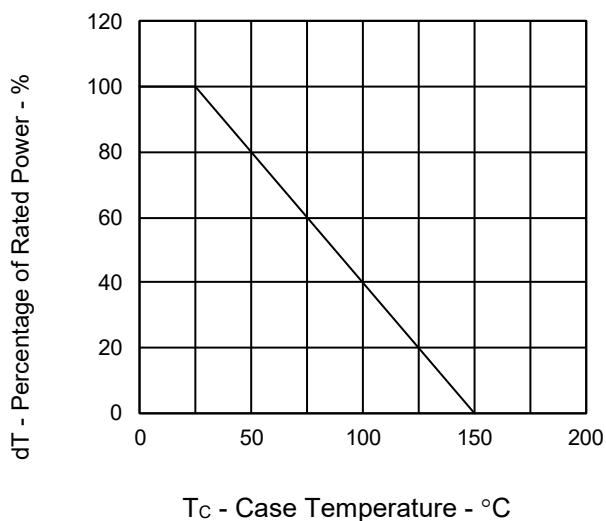
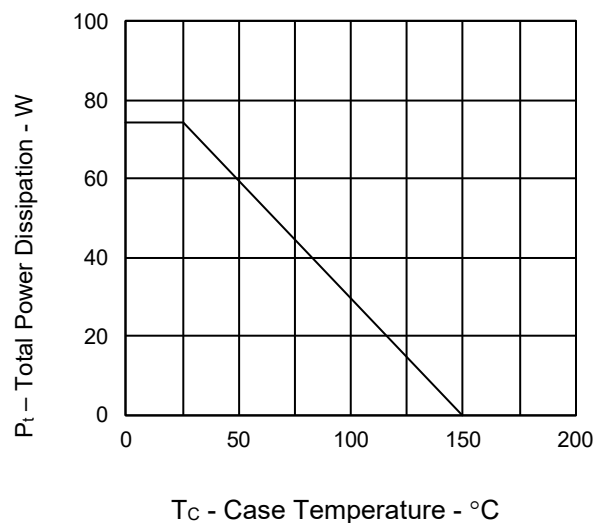
Notes: 4. This data is the designed target maximum value on Renesas's measurement condition. (Not tested)

Electrical Characteristics (T_A = 25°C)

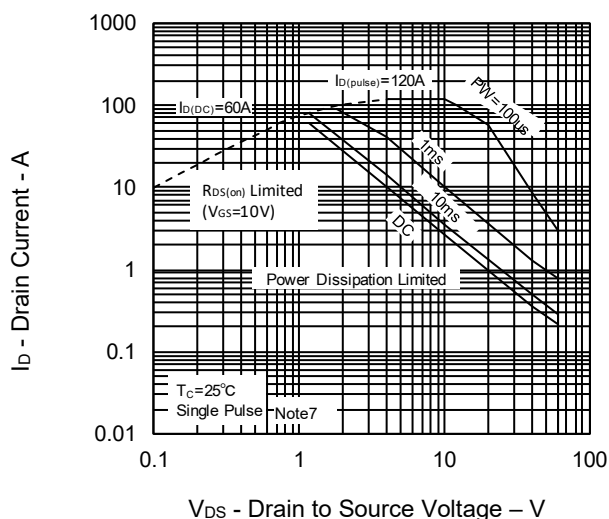
Item	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I _{DSS}			1	μA	V _{DS} = 60 V, V _{GS} = 0 V
Gate Leakage Current	I _{GSS}			±100	nA	V _{GS} = ±20 V, V _{DS} = 0 V
Gate to Source Cut-off Voltage	V _{GS(off)}	2.0		4.0	V	V _{DS} = 10 V, I _D = 1 mA
Forward Transfer Admittance ^{Note5}	y _{fs}		37		S	V _{DS} = 5 V, I _D = 30 A
Drain to Source On-state Resistance ^{Note5}	R _{DS(on)}		10.7	12.9	mΩ	V _{GS} = 10 V, I _D = 30 A
Input Capacitance	C _{iss}		2170		pF	V _{DS} = 25 V V _{GS} = 0 V f = 1 MHz
Output Capacitance	C _{oss}		160		pF	
Reverse Transfer Capacitance	C _{rss}		90		pF	
Turn-on Delay Time	t _{d(on)}		17		ns	V _{DD} = 30 V, I _D = 30 A V _{GS} = 10 V R _G = 0 Ω
Rise Time	t _r		10		ns	
Turn-off Delay Time	t _{d(off)}		44		ns	
Fall Time	t _f		7		ns	
Total Gate Charge	Q _G		43		nC	V _{DD} = 48 V V _{GS} = 10 V I _D = 60 A
Gate to Source Charge	Q _{GS}		11		nC	
Gate to Drain Charge	Q _{GD}		13		nC	
Body Diode Forward Voltage ^{Note5}	V _{F(S-D)}			1.5	V	I _F = 60 A, V _{GS} = 0 V
Reverse Recovery Time	t _{rr}		32		ns	I _F = 60 A, V _{GS} = 0 V di/dt = 100 A/μs
Reverse Recovery Charge	Q _{rr}		26		nC	

Notes: 5. Pulsed test

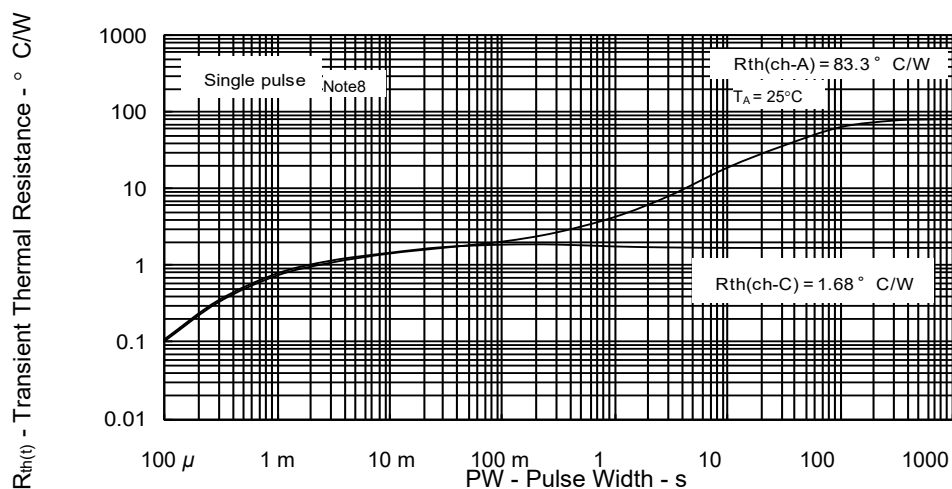
TEST CIRCUIT 1 AVALANCHE CAPABILITY

TEST CIRCUIT 2 SWITCHING TIME

TEST CIRCUIT 3 GATE CHARGE


Typical Characteristics Note6DERATING FACTOR OF FORWARD BIAS
SAFE OPERATING AREATOTAL POWER DISSIPATION vs.
CASE TEMPERATURE

FORWARD BIAS SAFE OPERATING AREA



TRANSIENT THERMAL RESISTANCE vs. PULSE WIDTH

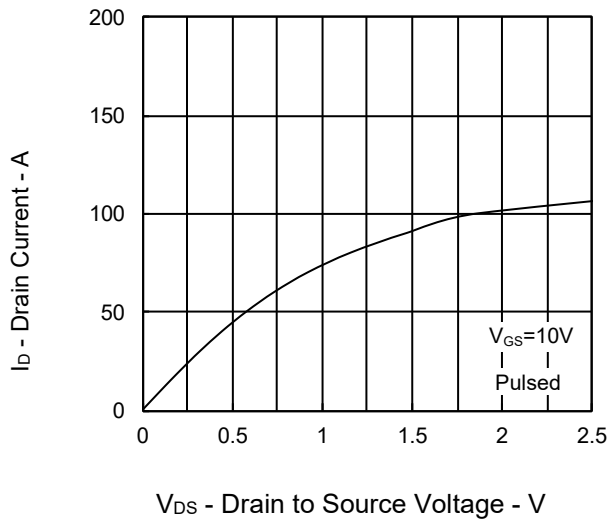


Notes: 6. Designed target value on Renesas measurement condition. (T_C = 25°C, unless otherwise specified)

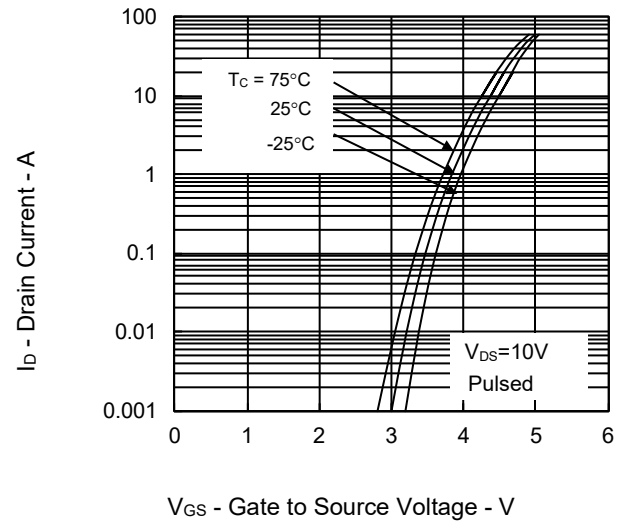
7. This data is the designed value on Renesas's measurement condition. Renesas recommends that operating conditions are designed according to a document "Power MOSFET/IGBT Attention of Handling Semiconductor Devices (R07ZZ0010)".

8. This data is the designed target maximum value on Renesas's measurement condition.

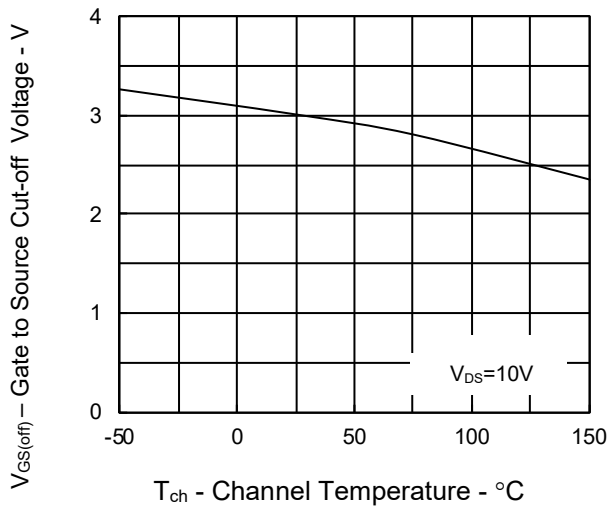
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



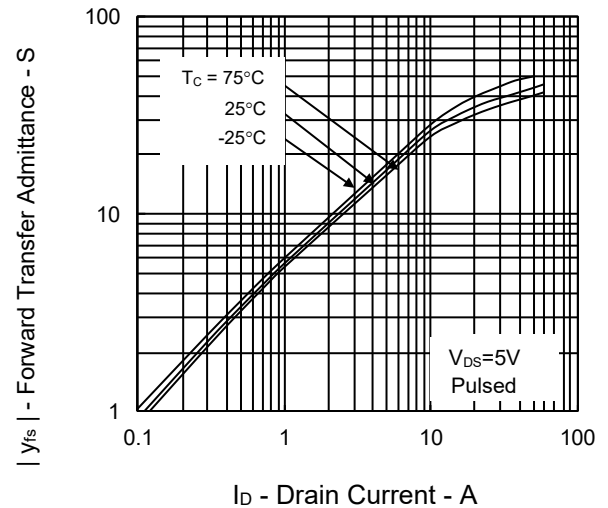
FORWARD TRANSFER CHARACTERISTICS



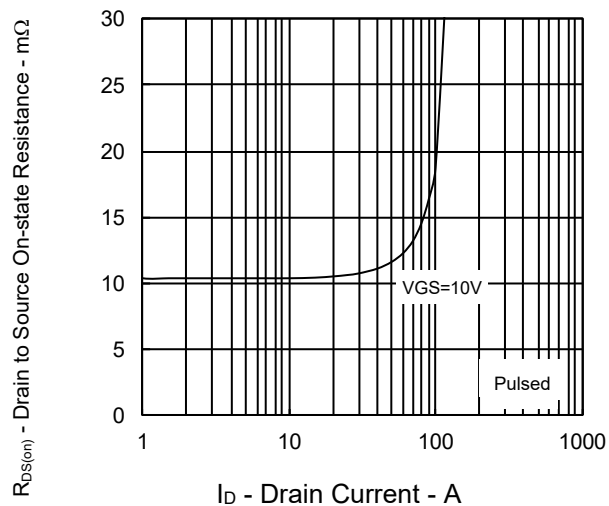
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



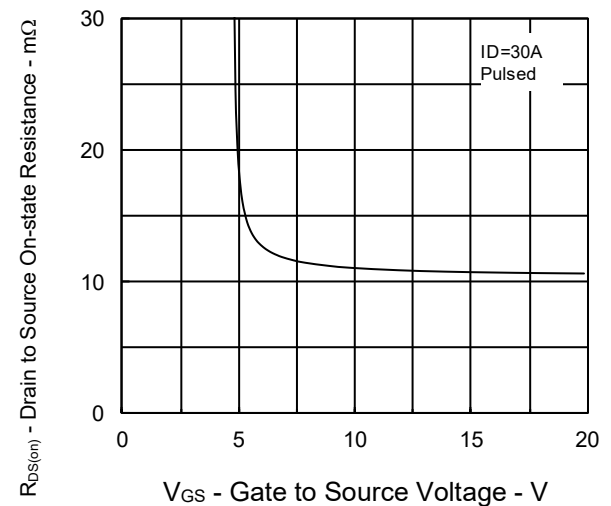
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT

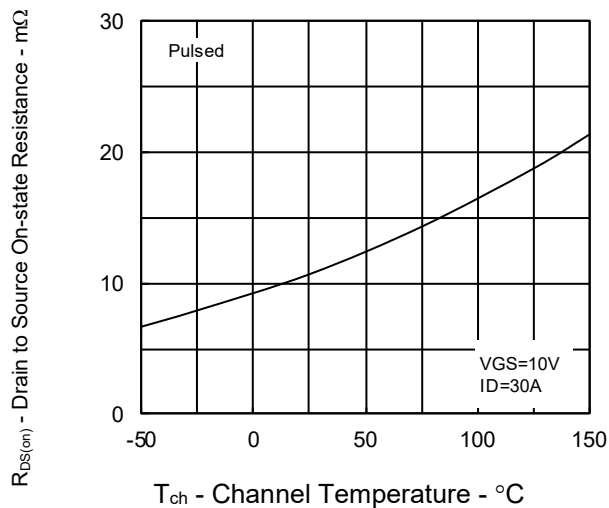
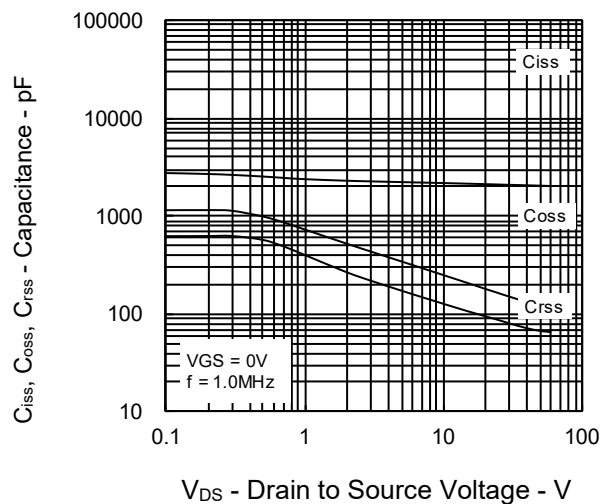


DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT

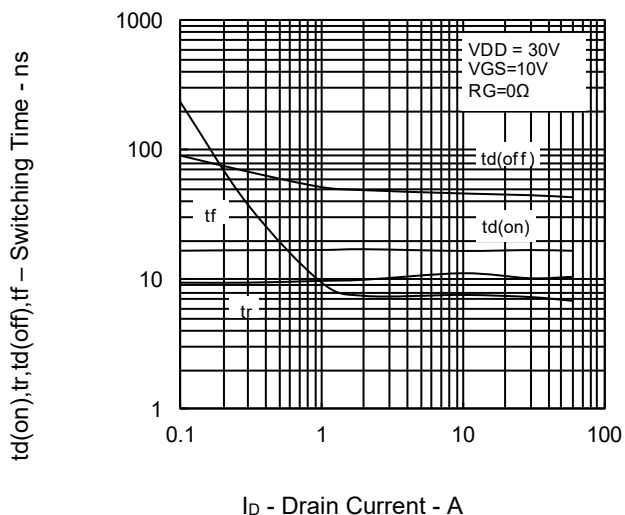


DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE

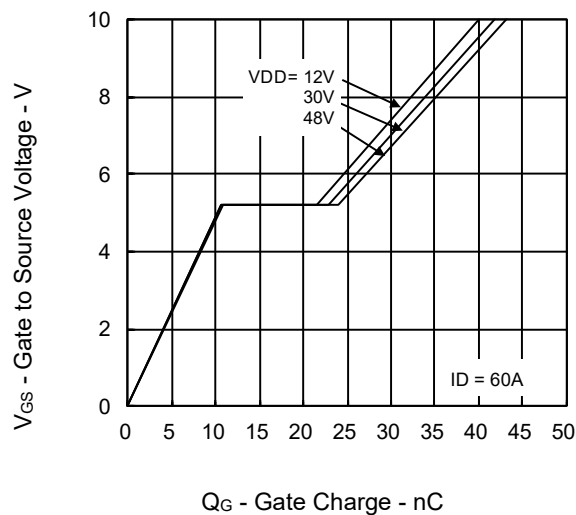
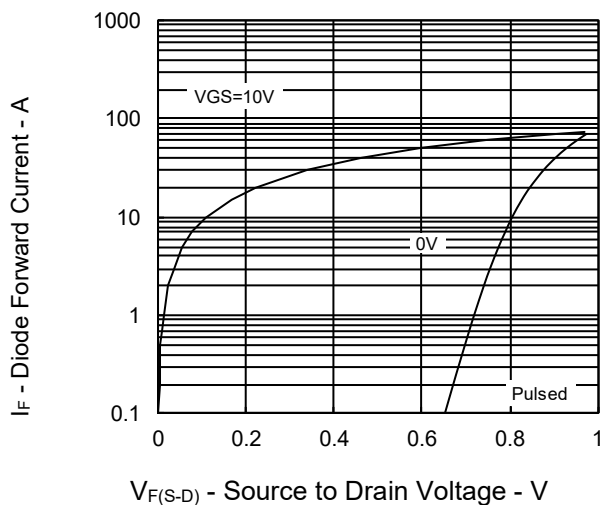
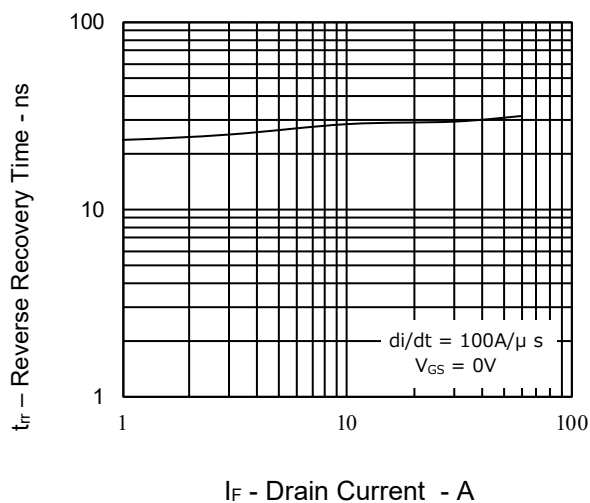


DRAIN TO SOURCE ON-STATE
RESISTANCE vs. CHANNEL TEMPERATURECAPACITANCE vs. DRAIN TO SOURCE
VOLTAGE

SWITCHING CHARACTERISTICS



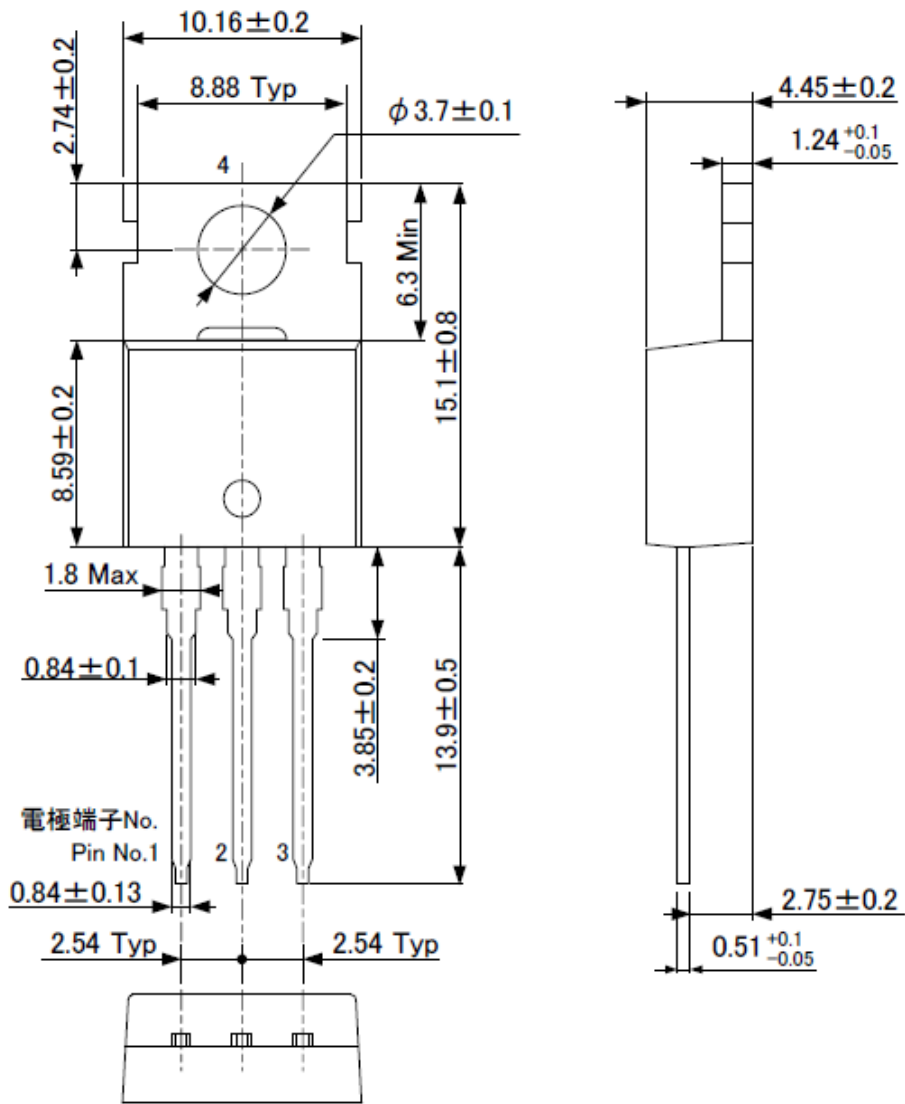
DYNAMIC INPUT CHARACTERISTICS

SOURCE TO DRAIN DIODE FORWARD
VOLTAGEREVERSE RECOVERY TIME vs.
DRAIN CURRENT

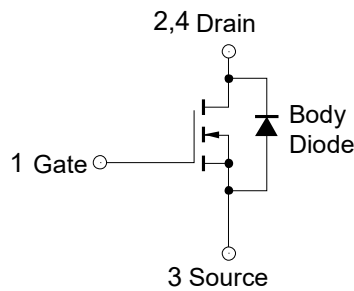
Package Drawings (Unit: mm)

JEDEC Package Code	RENESAS Code	Previous Code	MASS (Typ) [g]
TO-220AB	PRSS0004AU-A	TO-220ABB	2.1

Unit: mm



Equivalent Circuit



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