Data Sheet

RBA160N04AHPF-4UA01

40V – 160A – N-channel Power MOS FET

Application : Automotive

R07DS1344EJ0200
Rev.2.00
Jul. 8, 2020

Description

The RBA160N04AHPF-4UA01 is N-channel MOS Field Effect Transistor designed for high current switching applications.

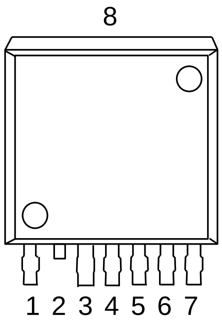
Features

- Super low on-state resistance
  $R_{DS(on)}$ = 1.25 mΩ MAX. (V_{GS} = 10 V, I_D = 80A)
- Low input capacitance
  Ciss = 8800pF TYP. (V_{DS} = 25 V)
- Designed for automotive application and AEC-Q101 qualified
- Pb-free (This product does not contain Pb in the external electrode)

Ordering Information

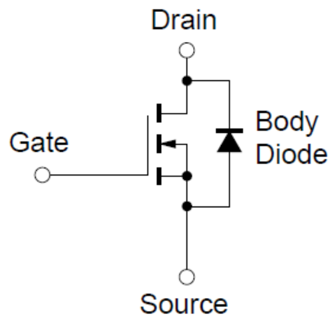
Part No.	Quantity	Shipping container
RBA160N04AHPF-4UA01#GB0	800pcs/reel	Taping

Outline



1. Gate
2. Drain
3, 4, 5, 6, 7. Source
8. Drain (Fin)

TO-263-7pin-SHL* (MP-25ZU)
* Short Head & Lead



Equivalent circuit

Remark Strong electric field, when exposed to this device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop generation of static electricity as much as possible, and quickly dissipate it once, when it has occurred.

Absolute Maximum Ratings

(T_A=25°C)

Item	Symbol	Ratings	Unit
Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	40	V
Gate to Source Voltage (V_{DS} = 0 V)	V_{GSS}	±20	V
Drain Current (DC) (T_C = 25 °C)	$I_{D(DC)}$	±160	A
Drain Current (pulse) Note1	$I_{D(pulse)}$	±640	A
Total Power Dissipation (T_C = 25 °C)	P_{T1}	250	W
Total Power Dissipation (T_A = 25 °C)	P_{T2}	1.8	W
Channel Temperature	T_{ch}	175	°C
Storage Temperature	T_{stg}	-55 to 175	°C
Repetitive Avalanche Current Note2	I_{AR}	55	A
Repetitive Avalanche Energy Note3	E_{AR}	303	mJ

Note 1. $P_W \leq 10\ \mu s$, Duty Cycle ≤ 1%

2. V_{GS} = 20 → 0V , R_G = 25 Ω

3. L = 100μH , V_{DD} = 20V , V_{GS} = 20 → 0V, R_G = 25 Ω

Thermal Resistance

Channel to Case Thermal Resistance	$R_{th(ch-C)}$	0.60	°C/W
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	°C/W

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} = 40 V, V_{GS} = 0 V
Gate Leakage Current	I_{GSS}			±100	nA	V_{GS} = ± 20 V, V_{DS} = 0 V
Gate to Source Threshold Voltage	$V_{GS(th)}$	2.0	3.0	4.0	V	V_{DS} = V_{GS}, I_D = 250 μA
Drain to Source On-state Resistance	$R_{DS(on)}$ Note4		1.05	1.25	mΩ	V_{GS} = 10 V, I_D = 80 A
Input Capacitance	C_{iss} Note5		8800	13200	pF	V_{DS} = 25 V
Output Capacitance	C_{oss} Note5		980	1470	pF	V_{GS} = 0 V
Reverse Transfer Capacitance	C_{rss} Note5		530	960	pF	f = 1 MHz
Turn-on Delay Time	$t_{d(on)}$ Note5		32	64	ns	V_{DD} = 20 V, I_D = 80 A
Rise Time	t_r Note5		22	53	ns	V_{GS} = 10 V
Turn-off Delay Time	$t_{d(off)}$ Note5		97	194	ns	R_G = 0 Ω
Fall Time	t_f Note5		22	53	ns	
Total Gate Charge	Q_G Note5		157	236	nC	V_{DD} = 32 V
Gate to Source Charge	Q_{GS} Note5		37		nC	V_{GS} = 10 V
Gate to Drain Charge	Q_{GD} Note5		40		nC	I_D = 160 A
Body Diode Forward Voltage	$V_{F(S-D)}$ Note4		0.9	1.5	V	I_F = 160 A, V_{GS} = 0 V
Reverse Recovery Time	t_{rr} Note5		71		ns	I_F = 160 A, V_{GS} = 0 V
Reverse Recovery Charge	Q_{rr} Note5		92		nC	di/dt = 100 A/μs

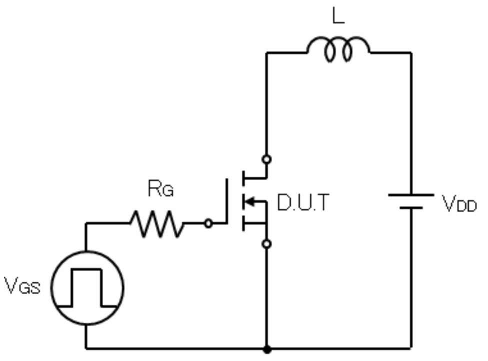
Note 4. Pulse test

Note 5. Refer value

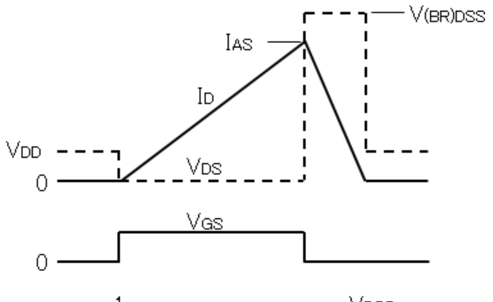
Test Circuit

Avalanche

Test Circuit



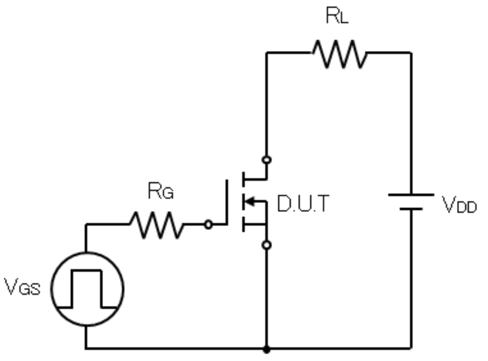
Waveform



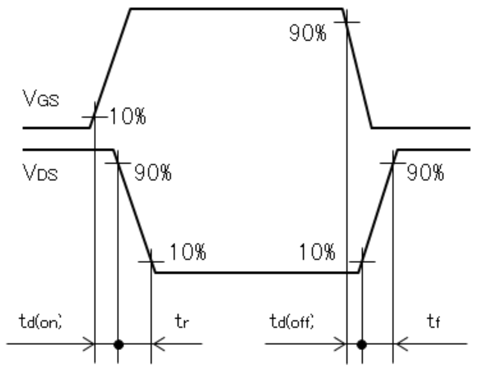
$$E_{AS} = \frac{1}{2} \cdot L \cdot I_{AS}^2 \cdot \frac{V_{DSS}}{V_{DSS} - V_{DD}}$$

Switching Time

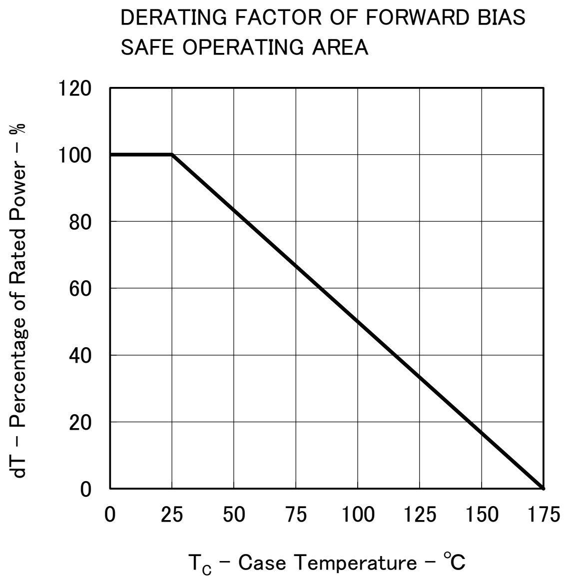
Test Circuit

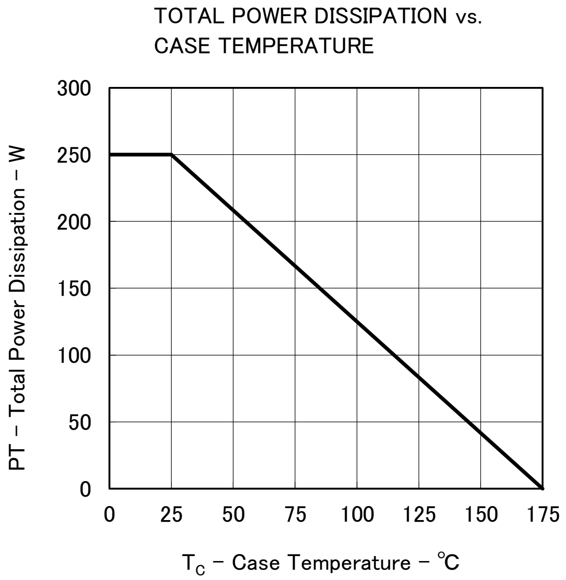


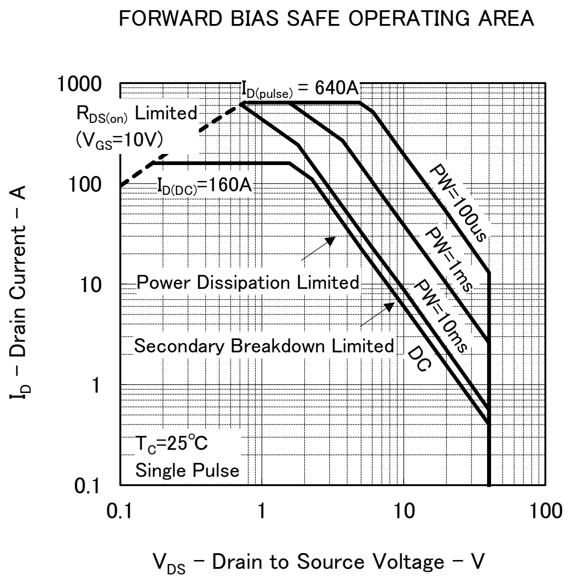
Waveform

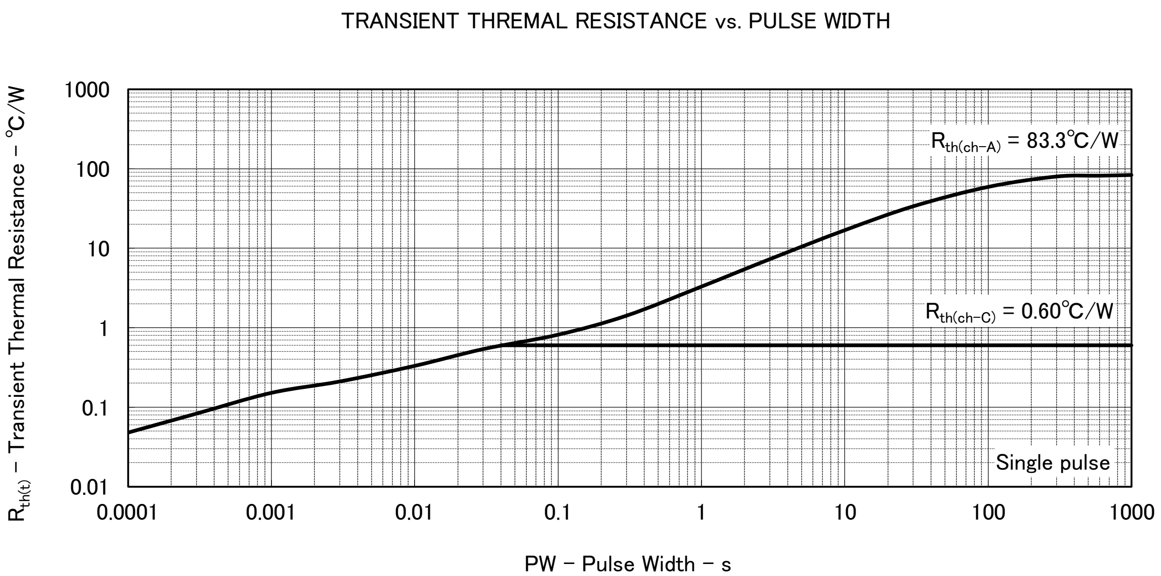


Typical Characteristics (TA = 25°C)

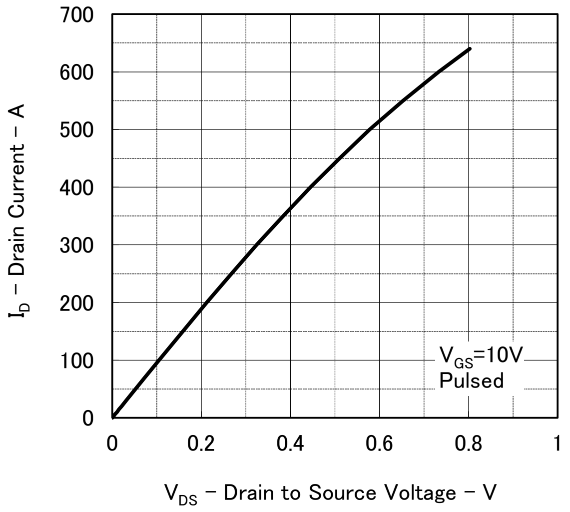




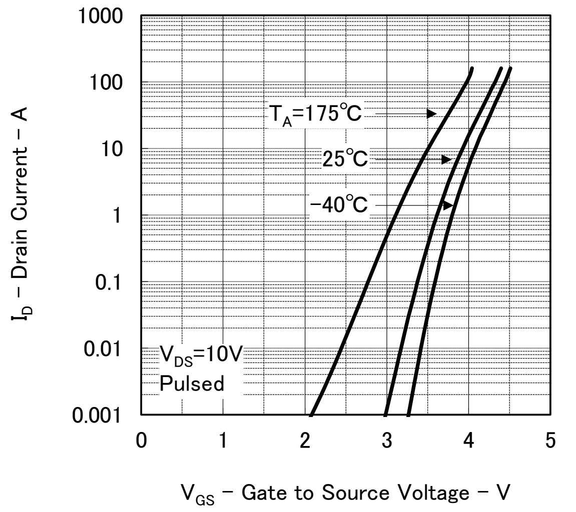




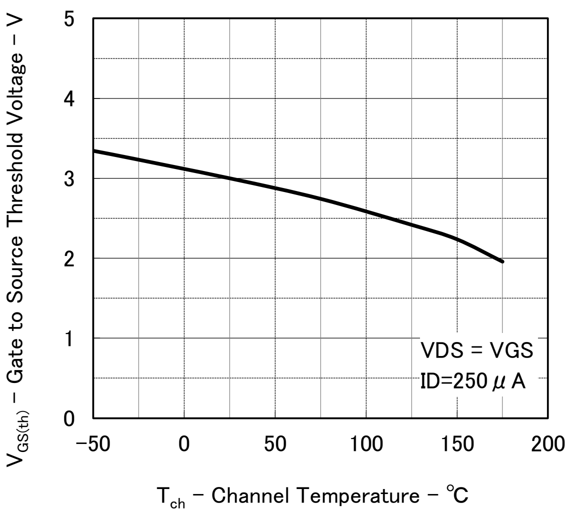
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



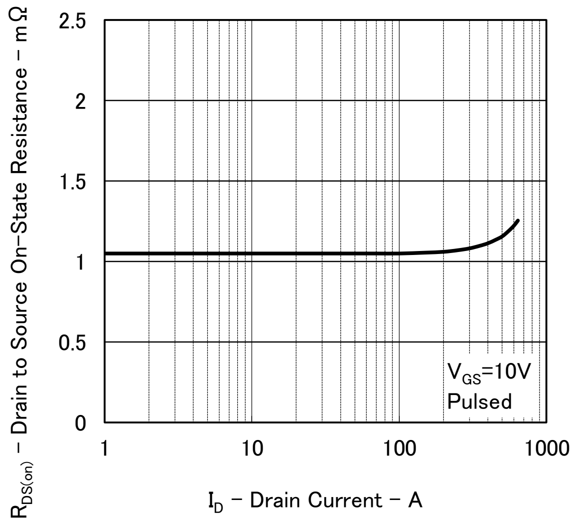
FORWARD TRANSFER CHARACTERISTICS



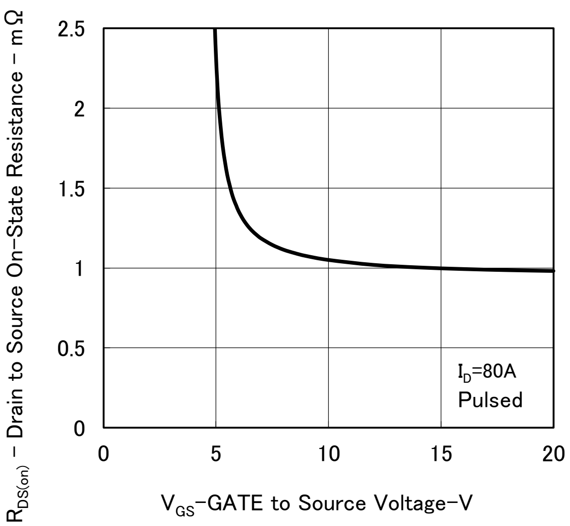
GATE TO SOURCE THRESHOLD VOLTAGE vs.
CHANNEL TEMPERATURE



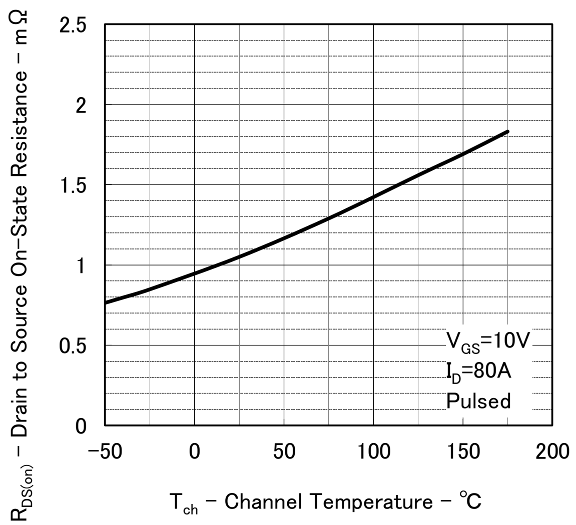
DRAIN TO SOURCE ON-STATE
RESISTANCE vs. DRAIN CURRENT



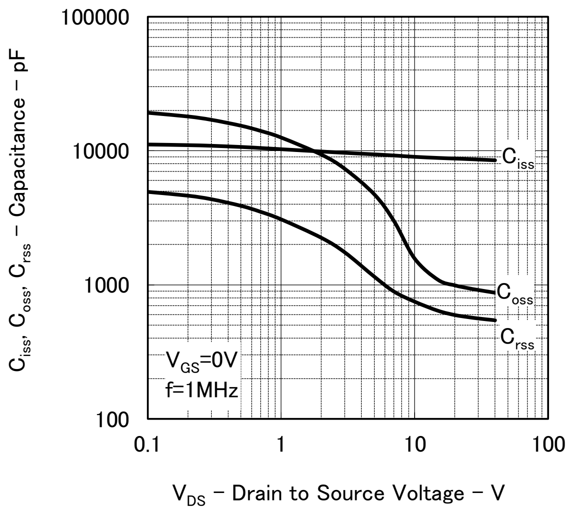
DRAIN TO SOURCE ON-STATERESISTANCE vs.
GATE TO SOURCE VOLTAGE



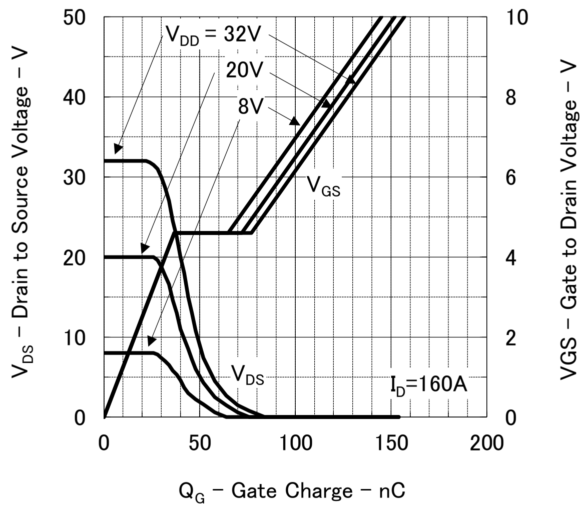
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



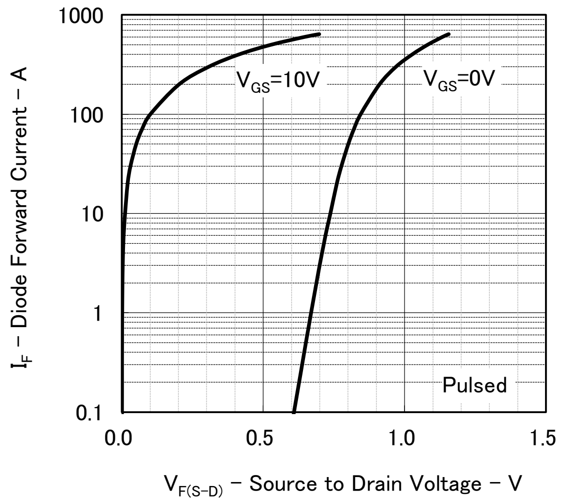
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



DYNAMIC INPUT/OUTPUT CHARACTERISTICS



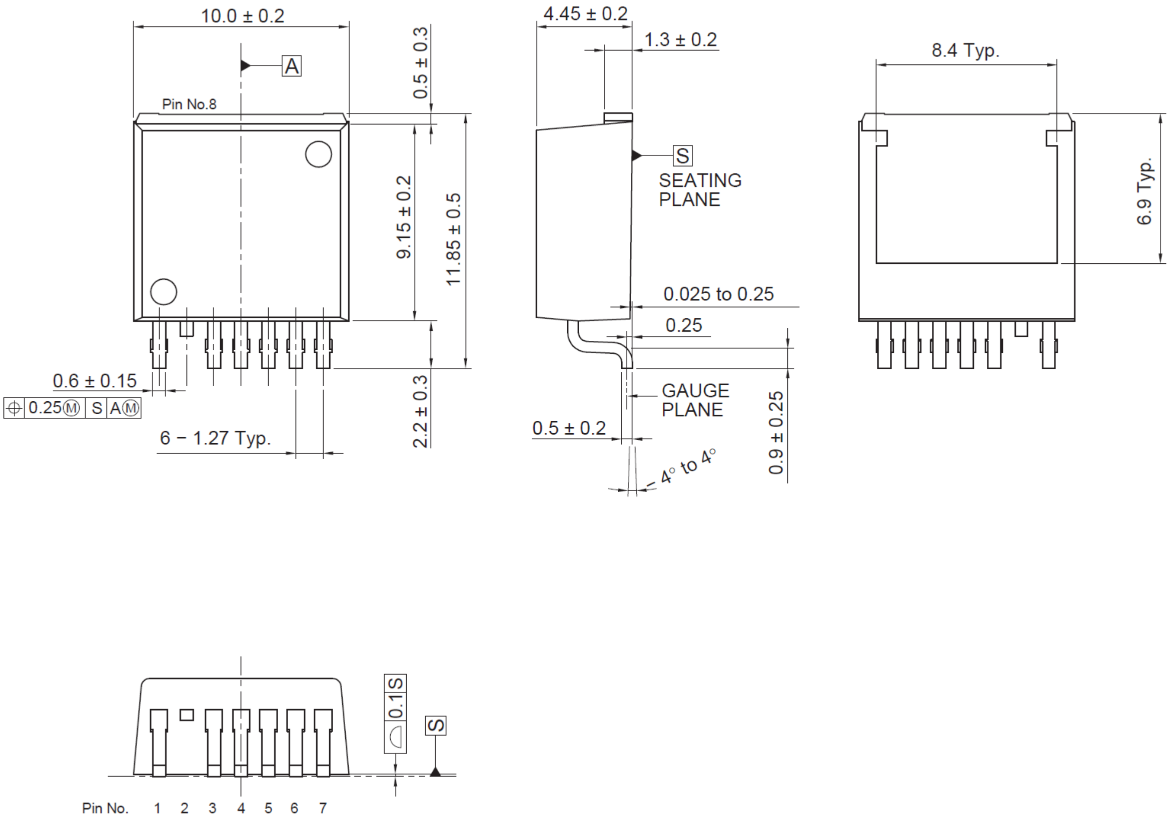
SOURCE TO DRAIN DIODE FORWARD VOLTAGE



Package Dimensions

JEITA Package Code	RENESAS Code	Previous Code	MASS (Typ) [g]	Package Name
—	PRSS0008DC-A	—	1.39	MP-25ZU

Unit: mm



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