

RBE013N08R1SZQ4

REXFET-1 N-Channel [Power MOSFET](#)

80 V - 340 A - 1.3 mΩ - TOLL

Description

The RBE013N08R1SZQ4 N-channel power MOSFET features REXFET-1 split-gate technology and is offered in a TOLL package. The TOLL package features top-side cooling for ultra-compact and optimal thermal performance. Renesas' REXFET-1 split gate technology is suitable for applications requiring low RDS(on) and switching capability for high-power and high-frequency applications.

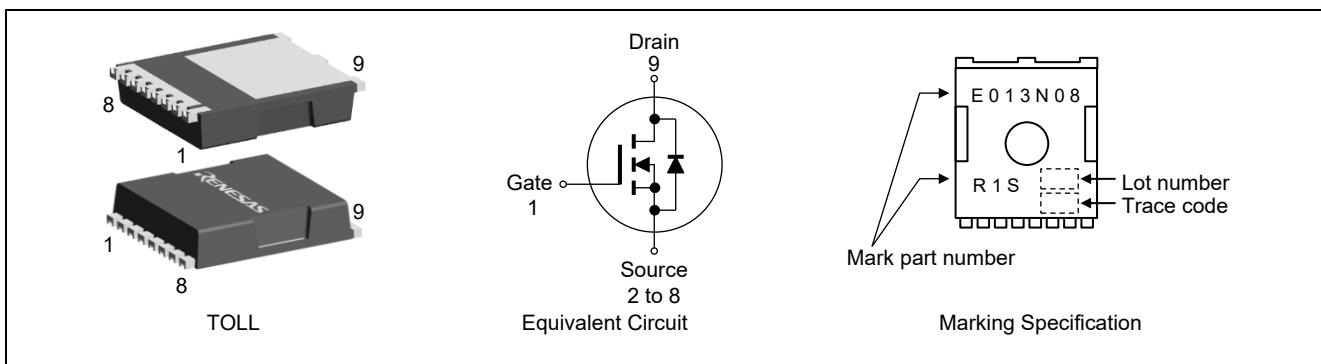
Features

- Standard level gate drive voltage: $V_{GS(th)} = 2.0$ to 4.0 V
- Super low on-state resistance: $R_{DS(on)} = 1.3$ mΩ Max.
- Low input capacitance
- Low thermal resistance
- 100% Avalanche tested
- Pb-free lead plating: RoHS compliant
- MSL1 classified according to IPC/JEDEC J-STD-020

Application

Motor Control, Energy Infrastructure, Industrial Automation, DC-DC Power Conversion, Power Tools, Robotics

Outline



Absolute Maximum Ratings

($T_j = 25$ °C unless otherwise notice.)

Item	Symbol	Ratings	Unit
Drain to Source Voltage	V_{DSS}	80	V
Gate to Source Voltage	V_{GSS}	± 20	V
Drain Current (DC)	$I_D(DC)$ <small>$T_c=25^\circ\text{C}$ Note 2,6</small>	± 340	A
	$I_D(DC)$ <small>$T_c=100^\circ\text{C}$ Note 2,6</small>	± 296	A
Drain Current (pulse)	$I_D(\text{pulse})$ <small>Note 1,3,6</small>	± 1360	A
Power Dissipation	P_D <small>Note 1,6</small>	468	W
Operating Junction Temperature	T_j	-55 to 175	°C
Storage Temperature	T_{stg}	-55 to 175	°C
Single Avalanche Current	I_{AS} <small>Note 4</small>	69	A
Single Avalanche Energy	E_{AS} <small>Note 4</small>	476	mJ

Thermal Resistance

Item	Symbol	Max.	Unit
Junction to Case Thermal Resistance	$R_{th(j-c)}$ Note 6	0.32	°C/W
Junction to Ambient Thermal Resistance	$R_{th(j-a)}$ Note 5,6	40	°C/W

Electrical Characteristics

($T_j = 25$ °C unless otherwise notice.)

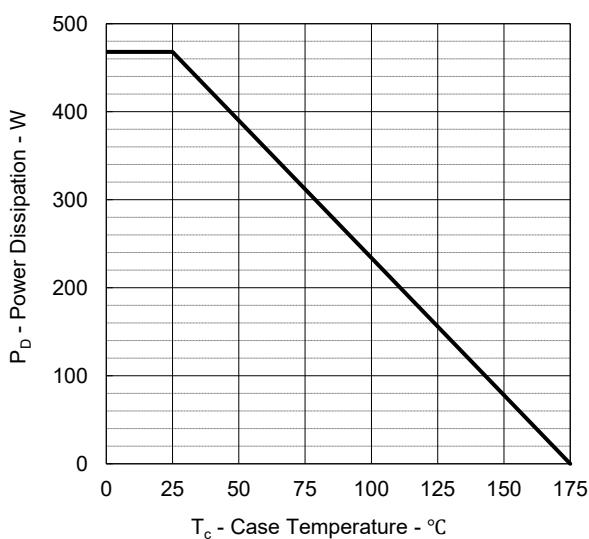
Item	Symbol	Min	Typ	Max	Unit	Test Conditions
Zero Gate Voltage Drain Current	I_{DSS}	—	—	10	μA	$V_{DS} = 80$ V, $V_{GS} = 0$ V
Gate Leakage Current	I_{GSS}	—	—	± 100	nA	$V_{GS} = \pm 20$ V, $V_{DS} = 0$ V
Gate to Source Threshold Voltage	$V_{GS(th)}$	2.0	—	4.0	V	$V_{DS} = V_{GS}$, $I_D = 250$ μA
Drain to Source On-state Resistance	$R_{DS(on)}$	—	1.16	1.3	$m\Omega$	$V_{GS} = 10$ V, $I_D = 100$ A
Input Capacitance	C_{iss}	—	14000	—	pF	$V_{DS} = 40$ V
Output Capacitance	C_{oss}	—	2100	—	pF	$V_{GS} = 0$ V
Reverse Transfer Capacitance	C_{rss}	—	70	—	pF	$f = 100$ kHz
Gate resistance	R_g	—	1.8	—	Ω	—
Turn-on Delay Time	$t_{d(on)}$	—	70	—	ns	$V_{DD} = 40$ V
Rise Time	t_r	—	45	—	ns	$I_D = 100$ A
Turn-off Delay Time	$t_{d(off)}$	—	125	—	ns	$V_{GS} = 10$ V
Fall Time	t_f	—	50	—	ns	$R_G = 5$ Ω
Total Gate Charge	Q_g	—	185	—	nC	$V_{DD} = 40$ V
Gate to Source Charge	Q_{gs}	—	74	—	nC	$V_{GS} = 10$ V
Gate to Drain Charge	Q_{gd}	—	32	—	nC	$I_D = 100$ A
Gate plateau voltage	$V_{plateau}$	—	5.4	—	V	
Output Charge	Q_{oss}	—	180	—	nC	$V_{DD} = 40$ V, $V_{GS} = 0$ V
Body Diode Forward Voltage	$V_{F(S-D)}$	—	0.84	1.5	V	$I_F = 100$ A, $V_{GS} = 0$ V
Reverse Recovery Time	t_{rr}	—	100	—	ns	$I_F = 100$ A, $V_{GS} = 0$ V
Reverse Recovery Charge	Q_{rr}	—	255	—	nC	$di/dt = 100$ A/ μs

Note 1. $T_c = 25$ °C

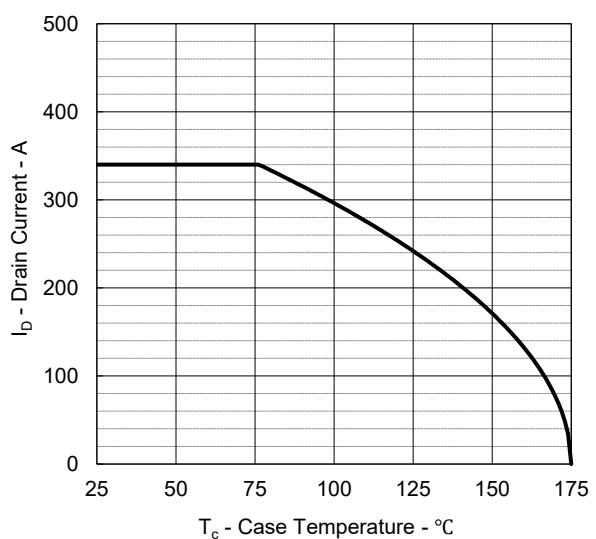
2. Value is limited by overall system design including PCB.
3. $PW \leq 10$ μs
4. $L = 100$ μH , $V_{DD} = 40$ V, $R_G = 25$ Ω
5. Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4. (2 oz Cu pad.)
6. Defined by design. Not subject to production test.

Typical Characteristics

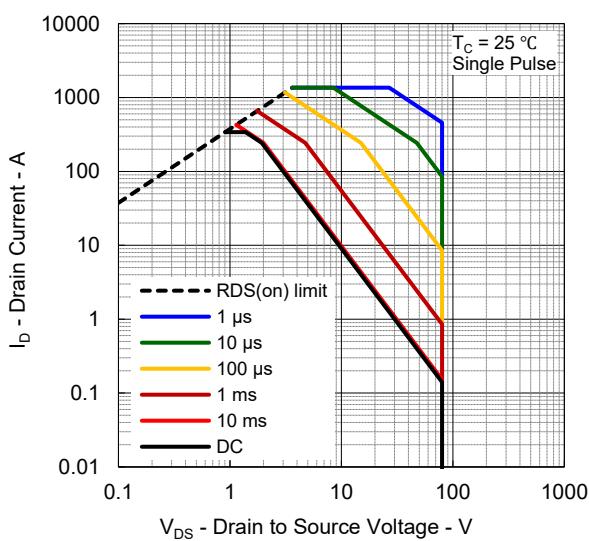
POWER DISSIPATION vs. CASE TEMPERATURE



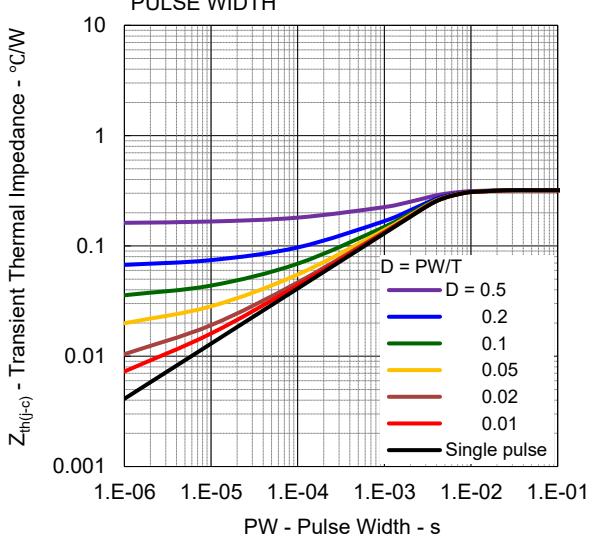
DRAIN CURRENT vs. CASE TEMPERATURE



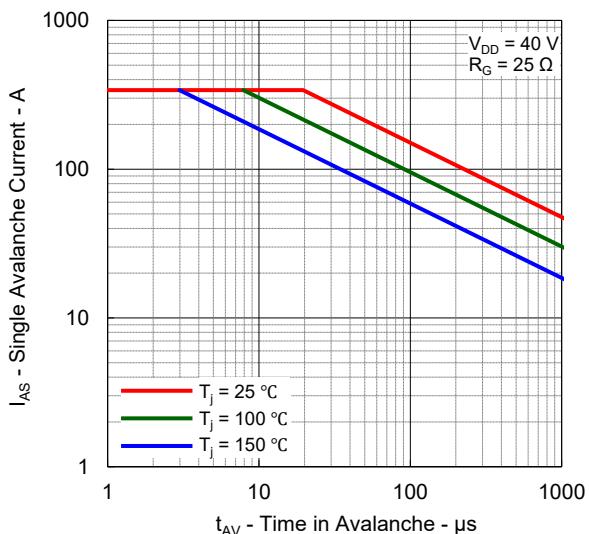
FORWARD BIAS SAFE OPERATING AREA



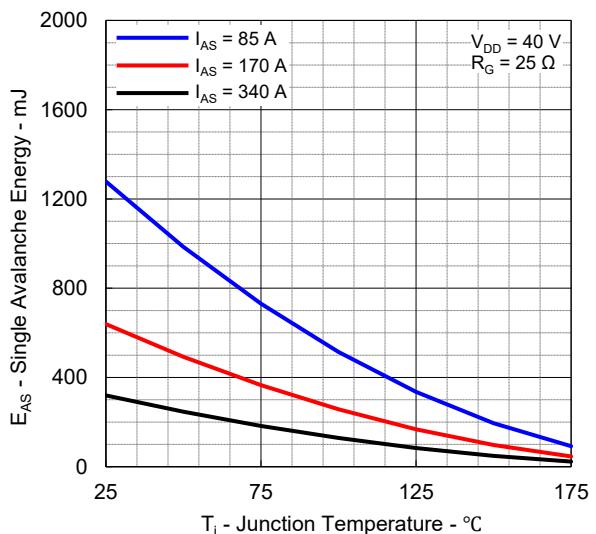
TRANSIENT THERMAL IMPEDANCE vs. PULSE WIDTH



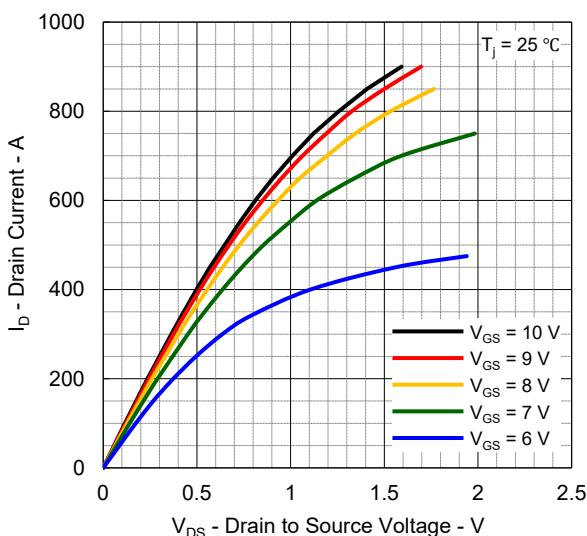
TYPICAL AVALANCHE CHARACTERISTICS



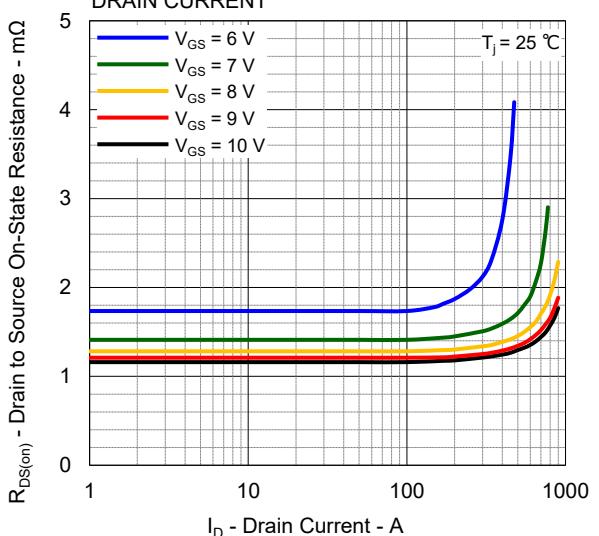
TYPICAL AVALANCHE ENERGY



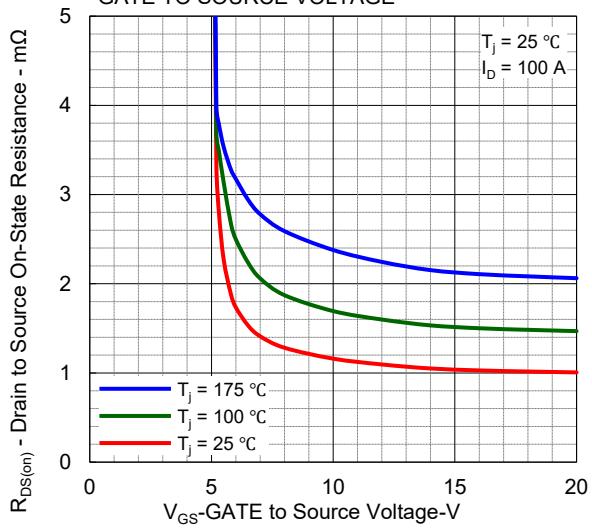
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



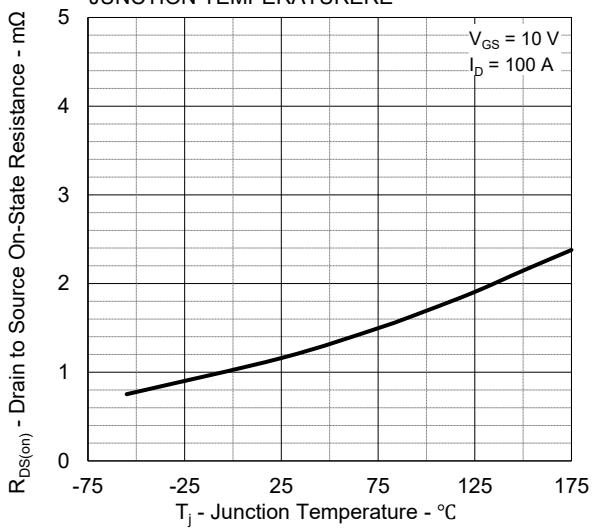
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



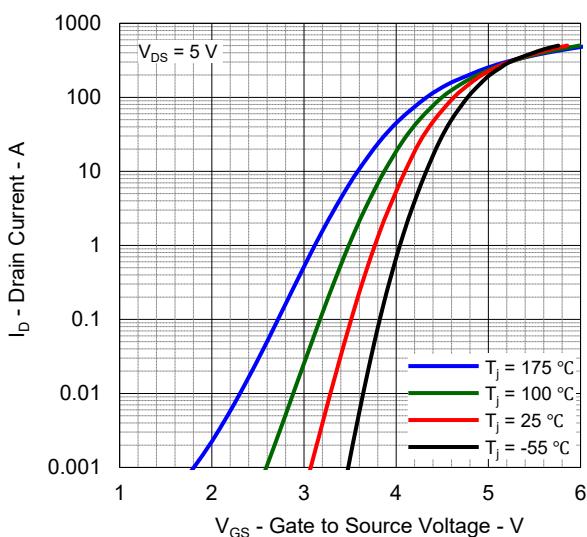
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



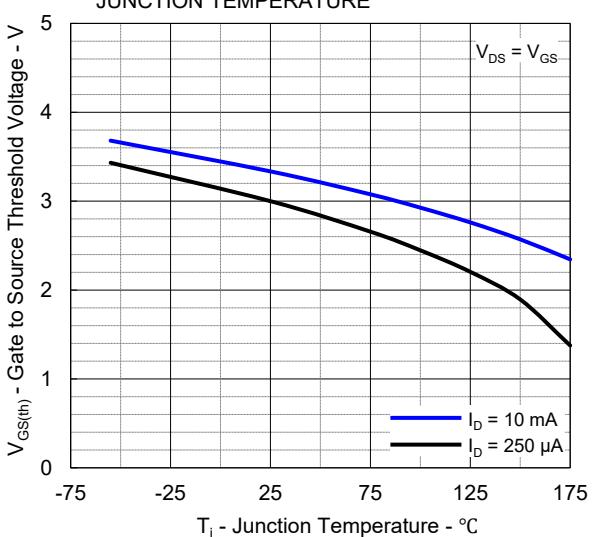
DRAIN TO SOURCE ON-STATE RESISTANCE vs. JUNCTION TEMPERATURE

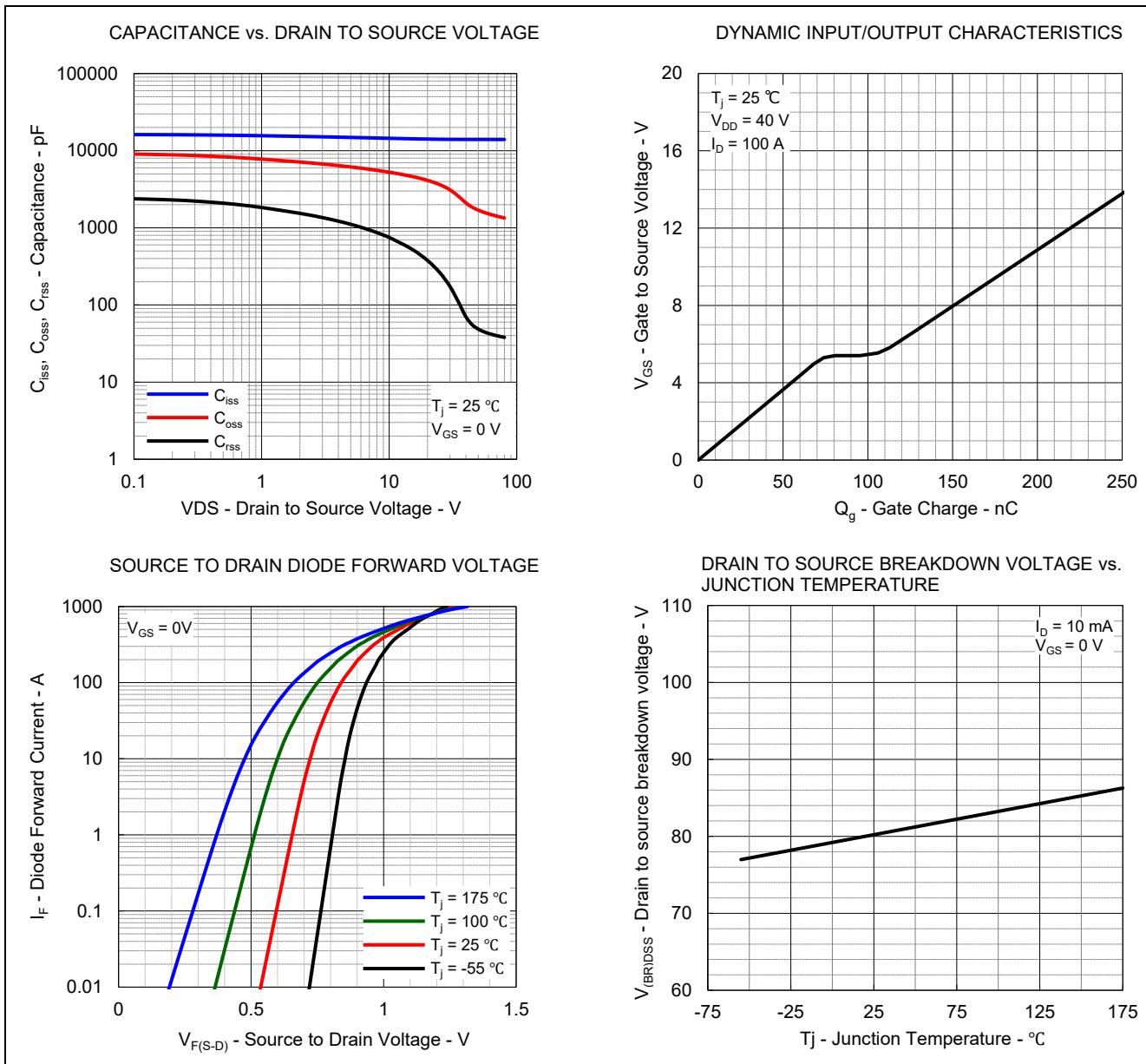


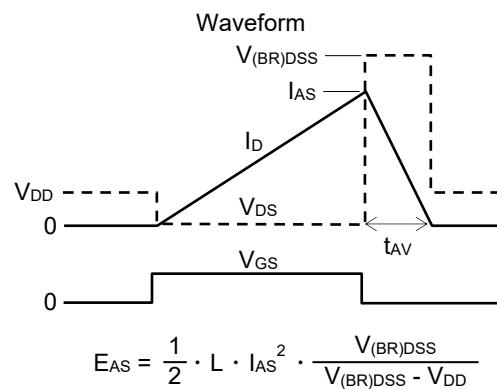
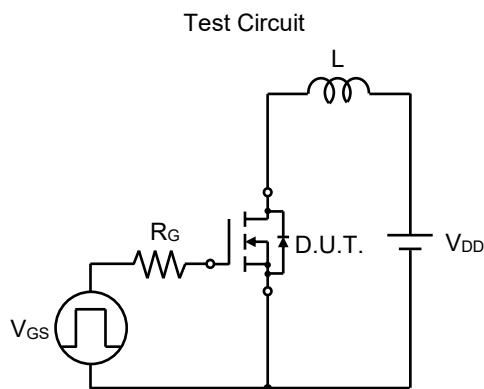
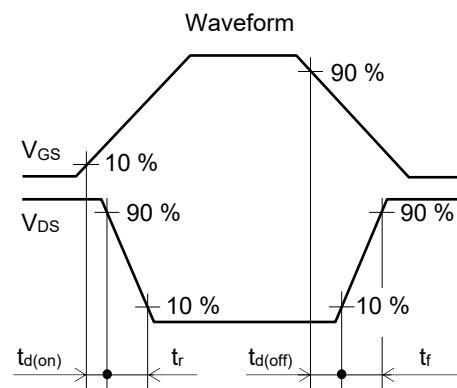
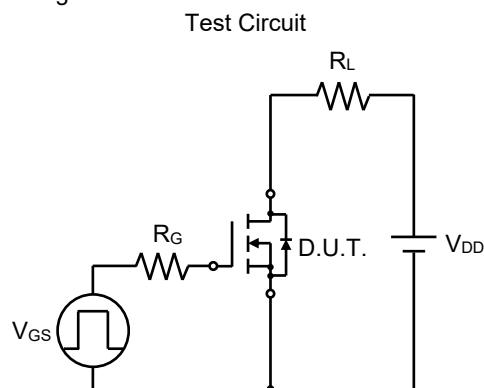
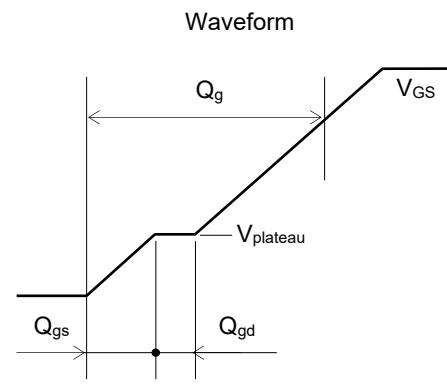
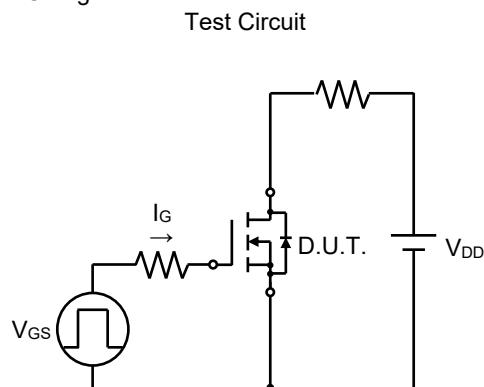
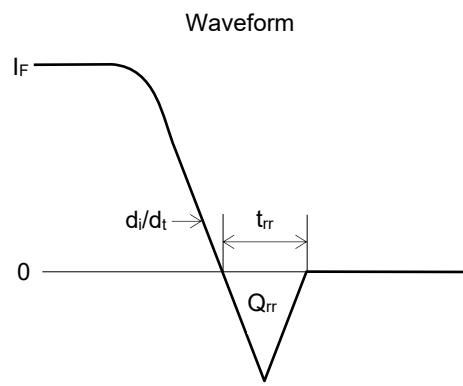
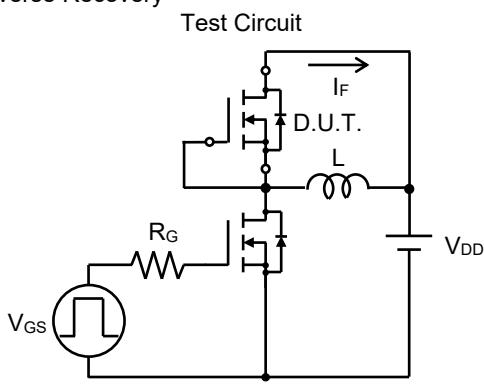
FORWARD TRANSFER CHARACTERISTICS



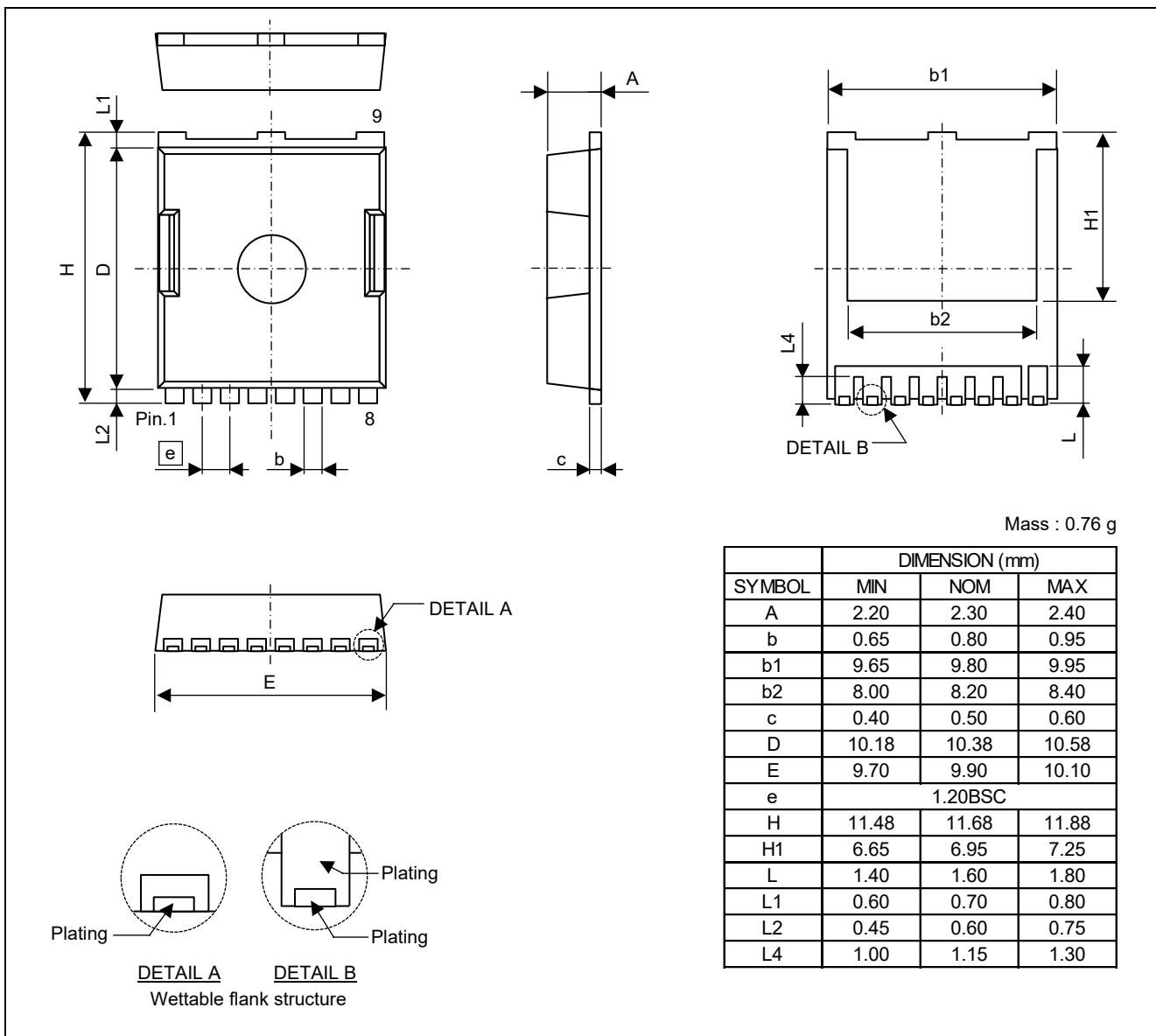
GATE TO SOURCE THRESHOLD VOLTAGE vs. JUNCTION TEMPERATURE



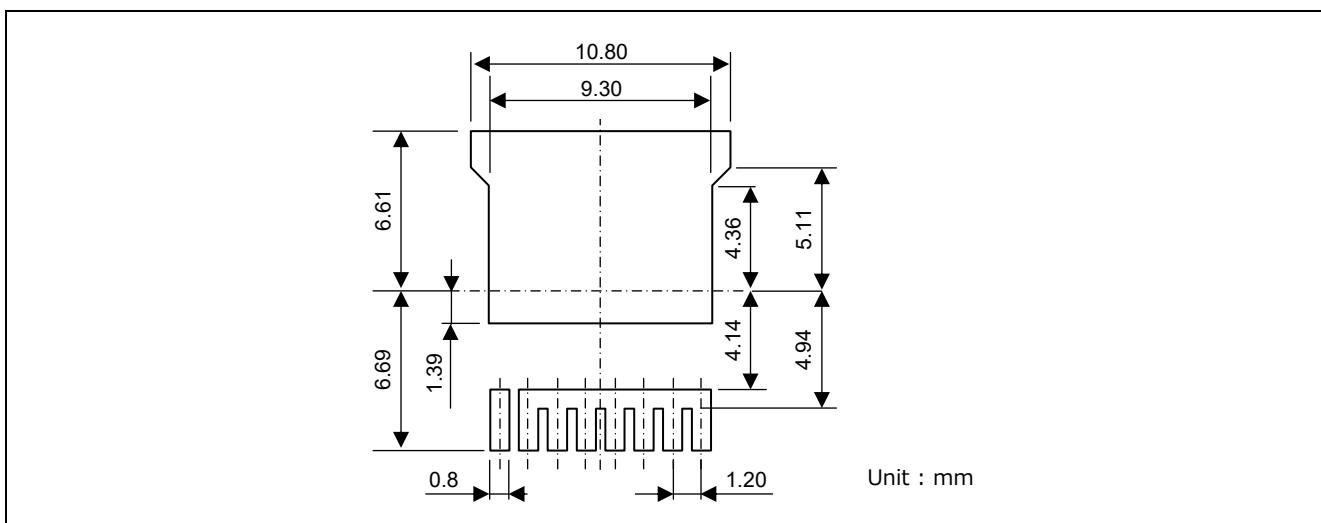


Test Circuit**Avalanche****Switching Time****Gate Charge****Reverse Recovery**

Package Dimensions



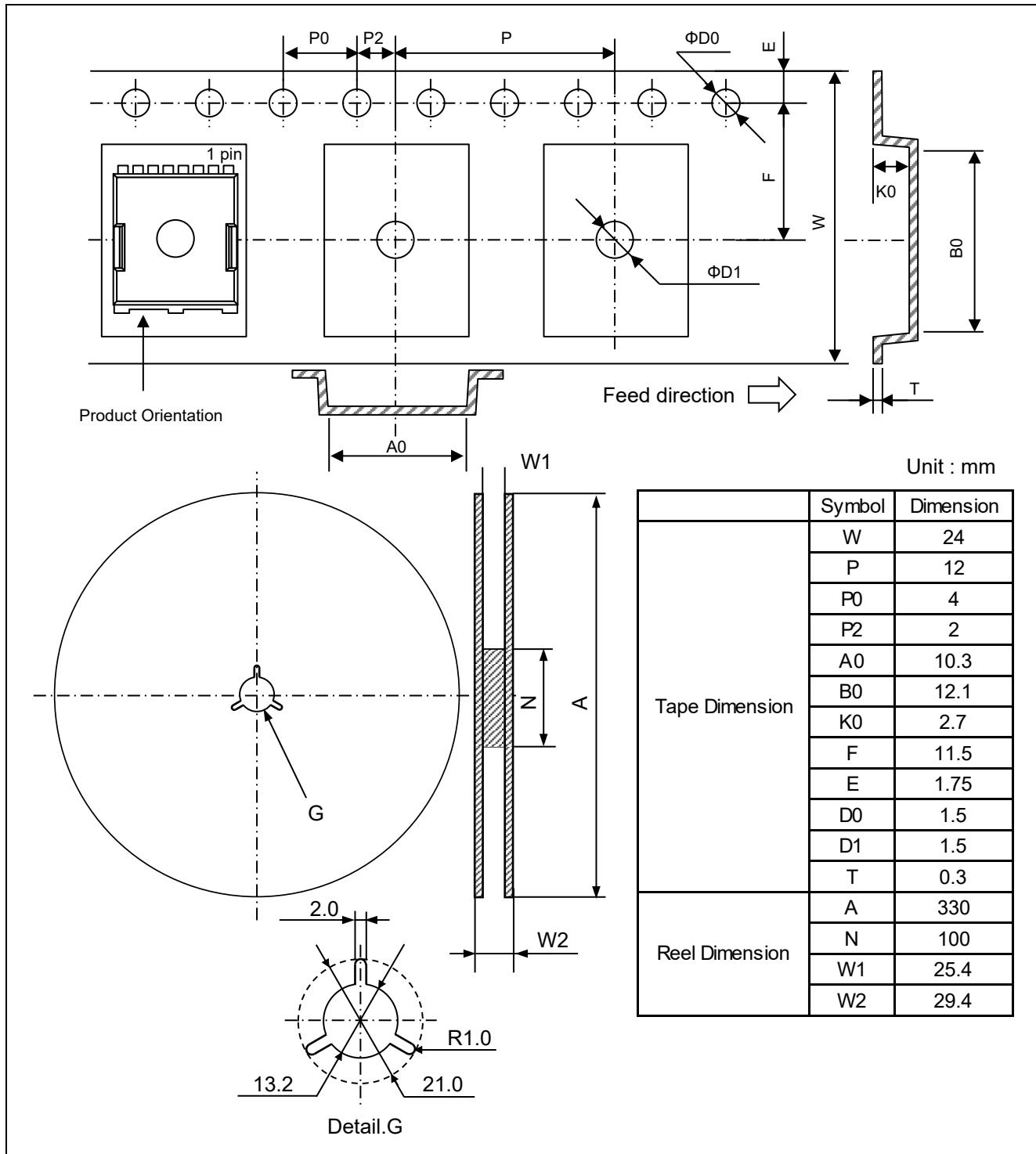
Mount pad



Ordering Information

Part No.	Packing	Quantity
RBE013N08R1SZQ4#GB0	Taping	2000pcs/reel

Packing Specification



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.

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