

QN7002

R07DS0269EJ0100

Rev.1.00

Mar 11, 2011

N-CHANNEL MOSFET FOR SWITCHING

Description

The QN7002, N-channel vertical type MOSFET designed for general-purpose switch, is a device which can be driven directly by a 4.5 V power source.

Features

- Directly driven by a 4.5 V power source.
- Low on-state resistance
 $R_{DS(on)1} = 2.7 \Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 100 \text{ mA)}$
 $R_{DS(on)2} = 3.2 \Omega \text{ MAX. (} V_{GS} = 4.5 \text{ V, } I_D = 50 \text{ mA)}$

Ordering Information

Part Number	Lead Plating	Packing	Package
QN7002-T1B-AT	Pure Sn	3000p/Reel	SC-59 (Mini Mold)

Remark "-AT" indicates Pb-free. This product does not contain Pb in external electrode and other parts.

Remark for Agent

ORDER NUMBER "2SK4079(1)" must be used to order, instead of "QN7002". For instance, "2SK4079(1)-T1B-AT"

Absolute Maximum Ratings (TA = 25°C)

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)	$I_{D(DC)}$	200	mA
Drain Current (pulse) ^{Note}	$I_{D(pulse)}$	± 800	mA
Total Power Dissipation	P_T	200	mW
Channel Temperature	T_{ch}	150	°C
Storage Temperature	T_{stg}	-55 to +150	°C

Note $PW \leq 10 \mu s$, Duty Cycle $\leq 1\%$

Caution This product is electrostatic-sensitive device due to low ESD capability and should be handled with caution for electrostatic discharge.

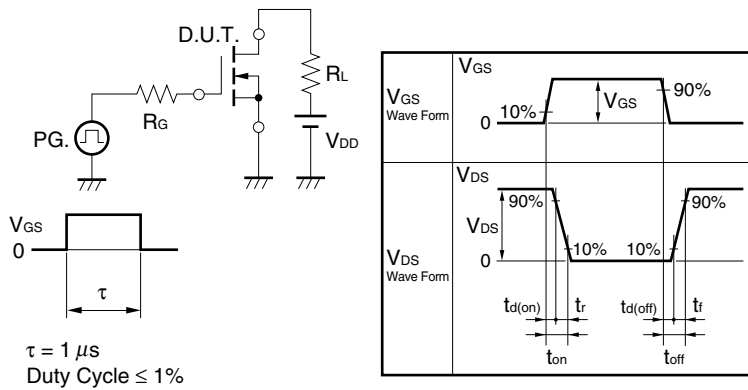
$V_{ESD} \pm 400 \text{ V (MIL STD; } C = 100 \text{ pF, } R = 1.5 \text{ k}\Omega, 5 \text{ times)}$, as reference value.

Electrical Characteristics (T_A = 25°C)

Characteristics	Symbol	Test Conditions	MIN.	TYP.	MAX.	UNIT
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} = 60 V, V _{GS} = 0 V			1	μA
Gate Leakage Current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V			±10	μA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.0		2.5	V
Forward Transfer Admittance ^{Note}	y _{fs}	V _{DS} = 10 V, I _D = 100 mA	150			mS
Drain to Source On-state Resistance ^{Note}	R _{DS(on)1}	V _{GS} = 10 V, I _D = 100 mA		2.1	2.7	Ω
	R _{DS(on)2}	V _{GS} = 4.5 V, I _D = 50 mA		2.4	3.2	Ω
Input Capacitance	C _{iss}	V _{DS} = 10 V,		20		pF
Output Capacitance	C _{oss}	V _{GS} = 0 V,		9		pF
Reverse Transfer Capacitance	C _{rss}	f = 1.0 MHz		2		pF
Turn-on Delay Time	t _{d(on)}	V _{DD} = 10 V,		16		ns
Rise Time	t _r	I _D = 200 mA,		6.5		ns
Turn-off Delay Time	t _{d(off)}	V _{GS} = 10 V,		82		ns
Fall Time	t _f	R _G = 10 Ω		32		ns
Total Gate Charge	Q _G	I _D = 200 mA, V _{DD} = 25 V, V _{GS} = 10 V		2		nC
Body Diode Forward Voltage ^{Note}	V _{F(S-D)}	I _F = 200 mA, V _{GS} = 0 V		0.86		V

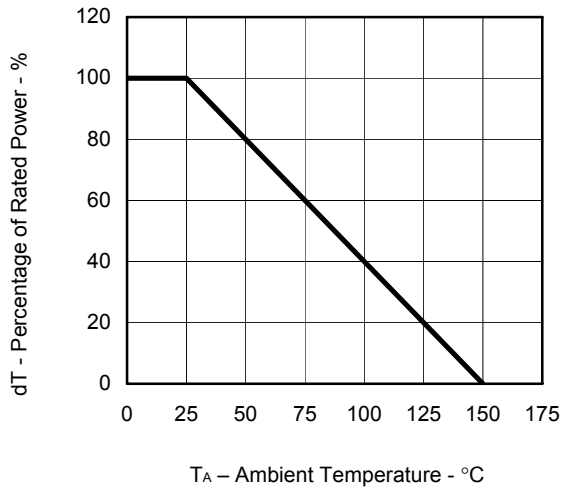
Note Pulsed

Test Circuit Switching Time

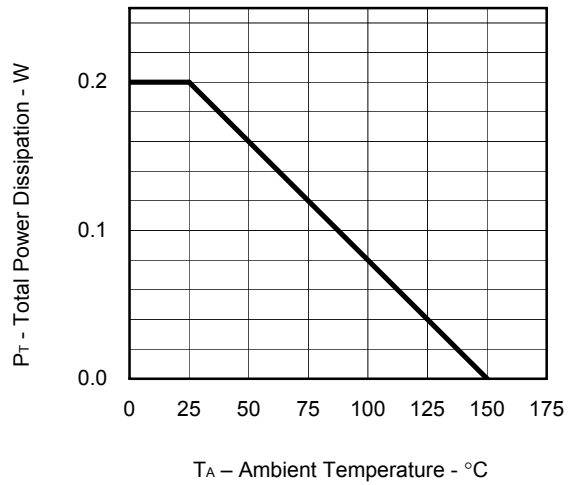


Typical Characteristics (T_A = 25°C)

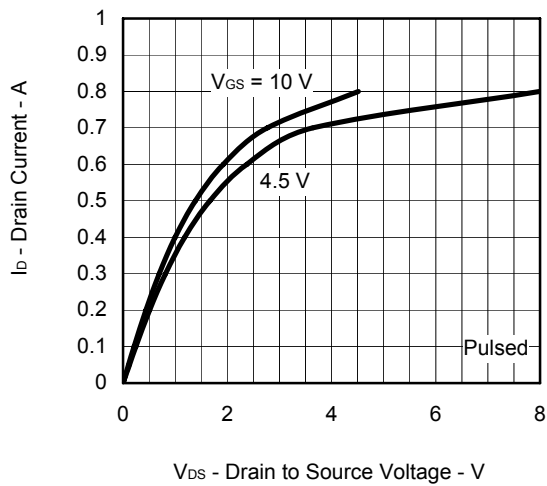
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



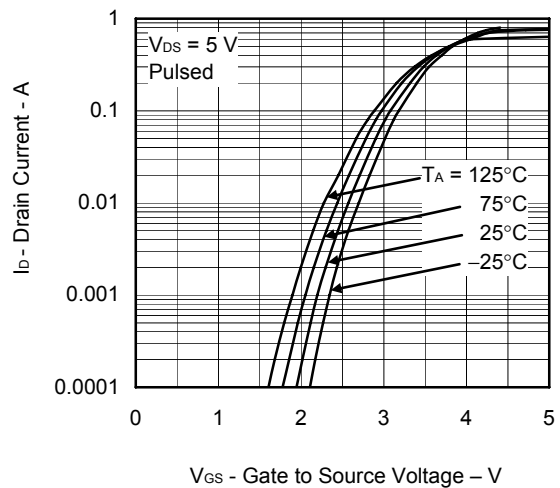
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



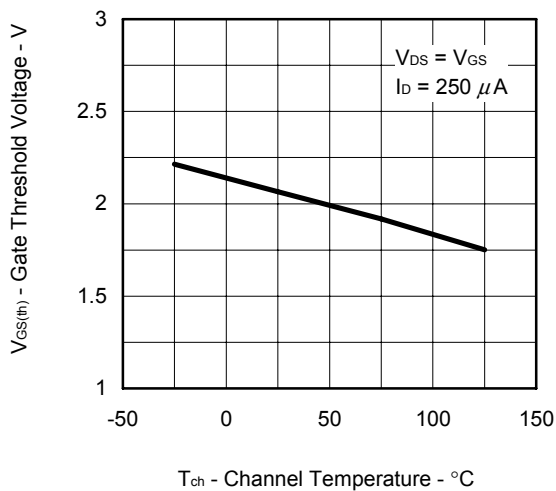
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



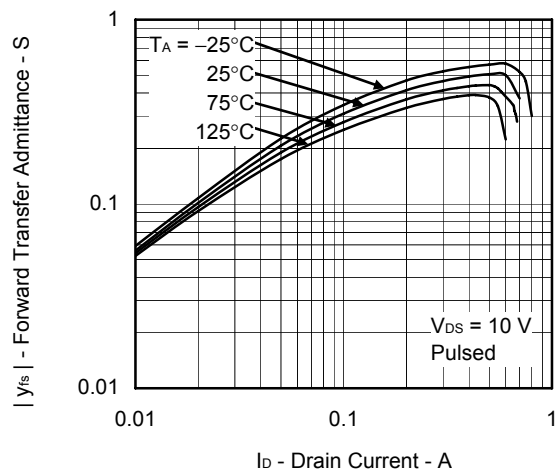
FORWARD TRANSFER CHARACTERISTICS



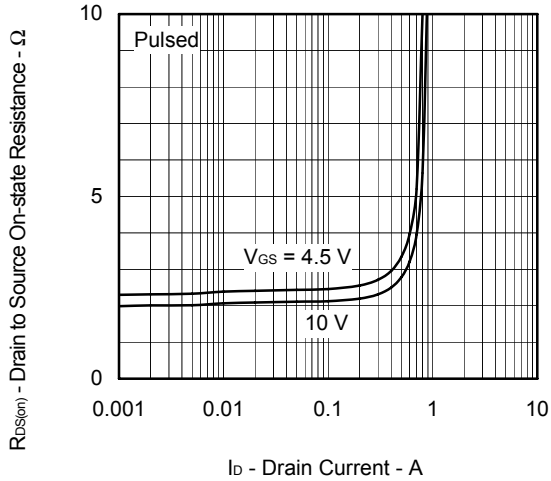
GATE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



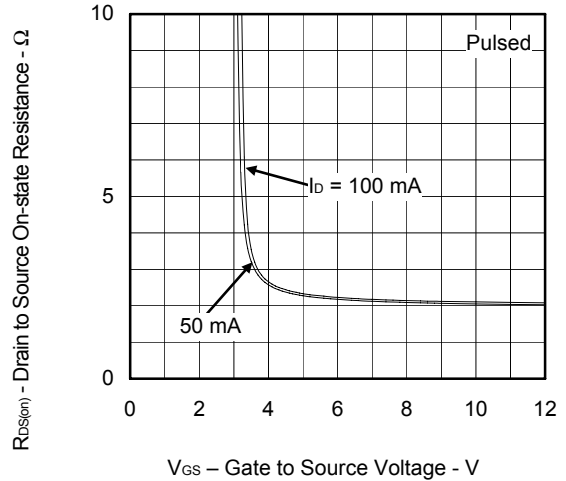
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



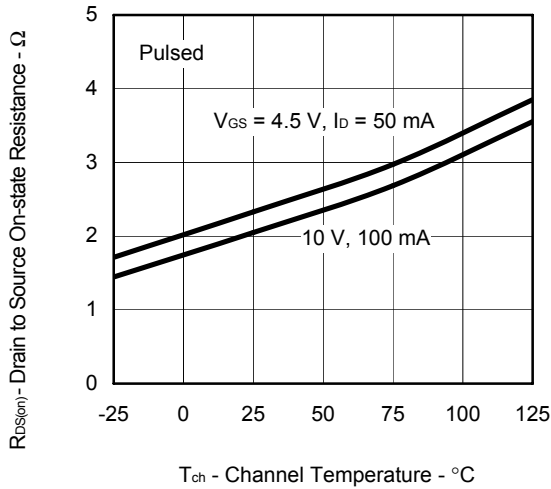
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



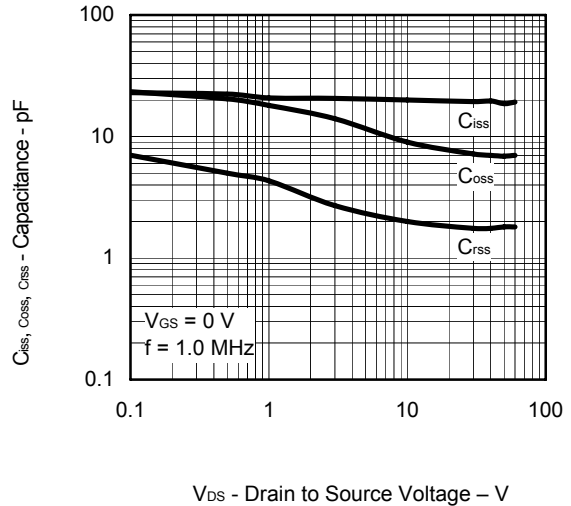
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



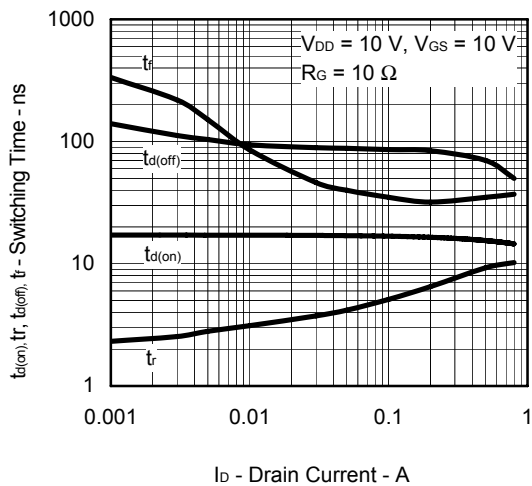
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



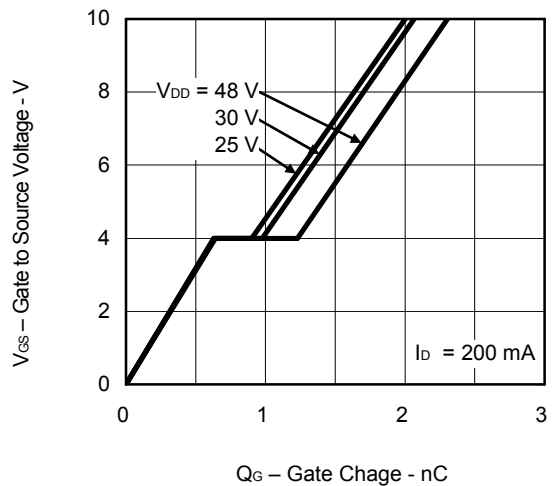
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



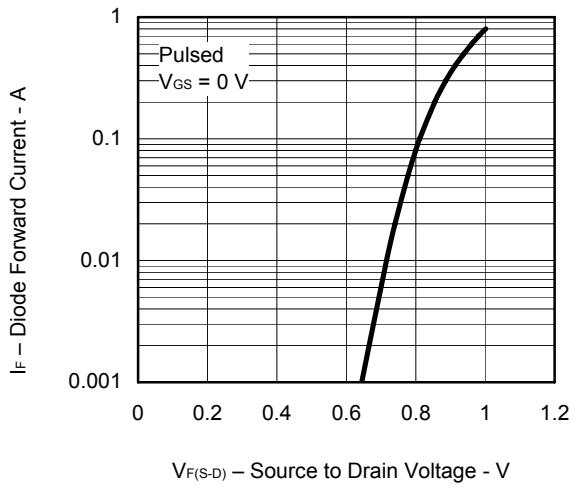
SWITCHING CHARACTERISTICS



DYNAMIC INPUT CHARACTERISTICS

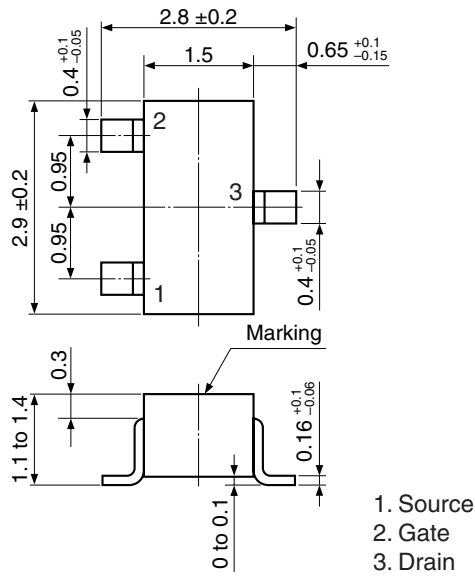


SOURCE TO DRAIN DIODE FORWARD VOLTAGE

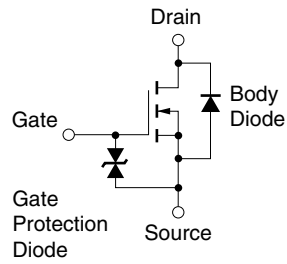


Package Drawings (Unit: mm)

SC-59 (Mini Mold)



Equivalent Circuit



Remark The diode connected between the gate and source of the transistor serves as a protector against ESD. When this device actually used, an additional protection circuit is externally required if a voltage exceeding the rated voltage may be applied to this device.

Revision History	QN7002 Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Mar 11, 2011	-	First Edition Issued

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Renesas Electronics America Inc.
2880 Scott Boulevard Santa Clara, CA 95050-2554, U.S.A.
Tel: +1-408-586-6000, Fax: +1-408-588-6130

Renesas Electronics Canada Limited
1101 Nicholson Road, Newmarket, Ontario L3Y 9C3, Canada
Tel: +1-905-898-5441, Fax: +1-905-898-3220

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: +44-1628-585-100, Fax: +44-1628-585-900

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-65030, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
7th Floor, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100083, P.R.China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 204, 205, AZIA Center, No.1233 Lujiazui Ring Rd., Pudong District, Shanghai 200120, China
Tel: +86-21-5877-1818, Fax: +86-21-6887-7858 / -7898

Renesas Electronics Hong Kong Limited
Unit 1601-1613, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2886-9318, Fax: +852 2886-9022/9044

Renesas Electronics Taiwan Co., Ltd.
7F, No. 363 Fu Shing North Road Taipei, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
1 HarbourFront Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: +65-6213-0200, Fax: +65-6276-8001

Renesas Electronics Malaysia Sdn.Bhd.
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: +60-3-7955-9390, Fax: +60-3-7955-9510

Renesas Electronics Korea Co., Ltd.
11F., Samik Lavied' or Bldg., 720-2 Yeoksam-Dong, Kangnam-Ku, Seoul 135-080, Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5141