DATA SHEET

NEC

MOS FIELD EFFECT TRANSISTOR

QN7002

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 Ω MAX. (V_{GS} = 10 V, I_D = 100 mA)
  $R_{DS(on)2}$ = 3.2 Ω MAX. (V_{GS} = 4.5 V, I_D = 50 mA)

ORDERING INFORMATION

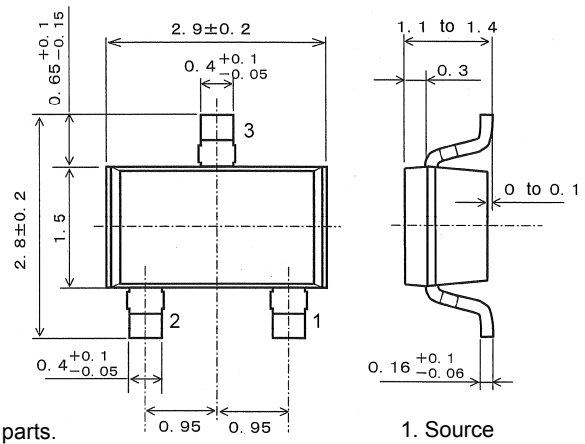
PART NUMBER	PACKAGE
QN7002-T1B-AT	SC-59 (Mini Mold)
QN7002-T2B-AT	

Remark "-AT" indicates Pb-free.
This product dose not contain Pb external electrode and other parts.
8 mm embossed carrier tape, 3,000 pcs/reel.

Remark for Agent ORDER NUMBER "2SK4079A(1)" must be used to order, instead of "QN7002".
For instance, "2SK4079A(1)-T1B-AT".

Marking: G28

PACKAGE DRAWING (Unit: mm)



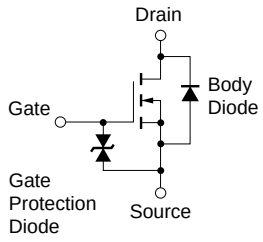
1. Source
2. Gate
3. Drain

ABSOLUTE MAXIMUM RATINGS (T_A = 25°C)

Drain to Source Voltage (V_{GS} = 0 V)	V_{DSS}	60	V
Gate to Source Voltage (V_{DS} = 0 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 ≤ 10 μs, Duty Cycle ≤ 1%

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.

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

V_{ESD} ±400 V (MIL STD; C = 100 pF, R = 1.5 kΩ, 5 times), as reference value.

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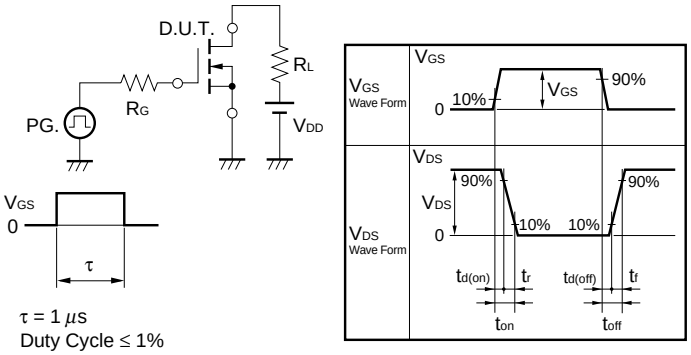
ELECTRICAL CHARACTERISTICS (T_A = 25°C)

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

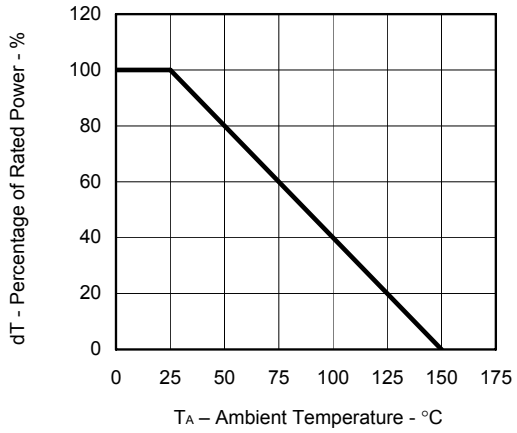
TEST CIRCUIT SWITCHING TIME



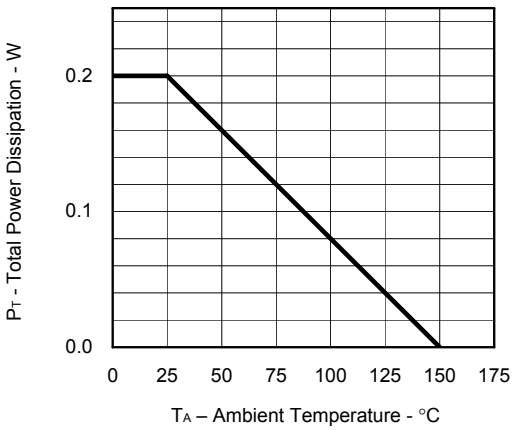
τ = 1 μs
Duty Cycle ≤ 1%

TYPICAL CHARACTERISTICS (T_A = 25°C)

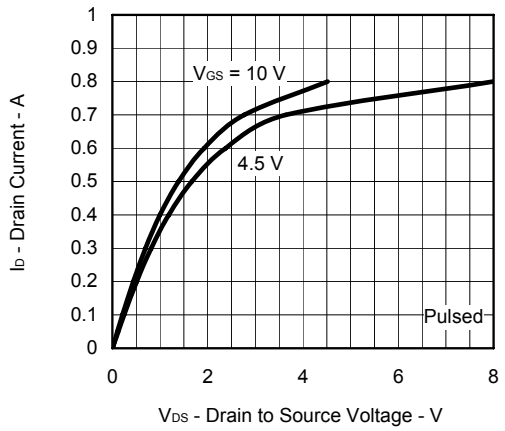
DERATING FACTOR OF FORWARD BIAS SAFE OPERATING AREA



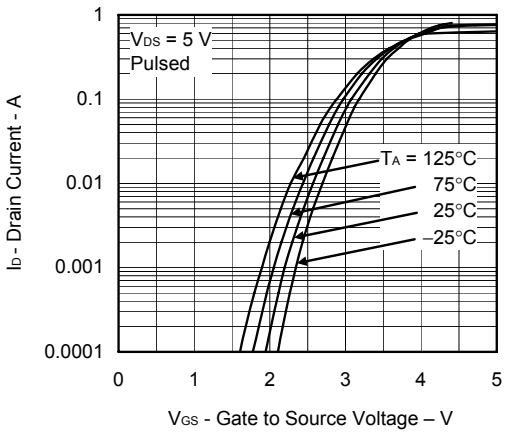
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



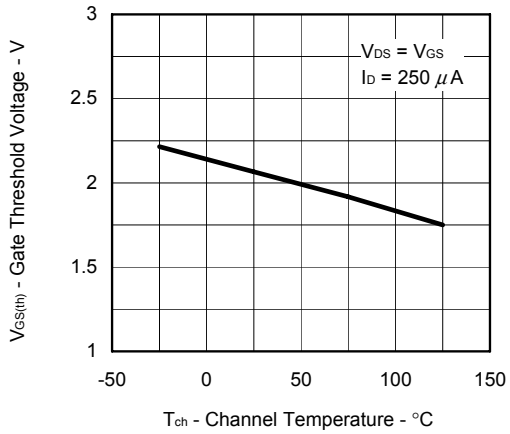
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



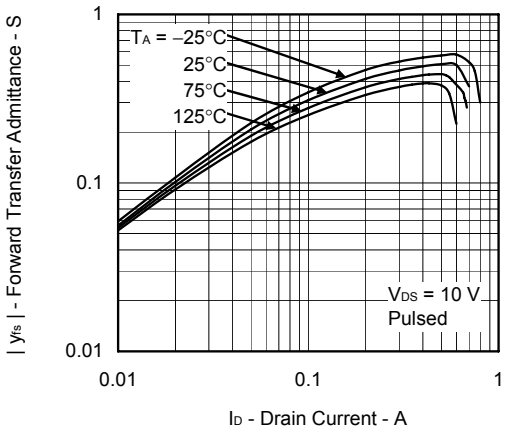
FORWARD TRANSFER CHARACTERISTICS



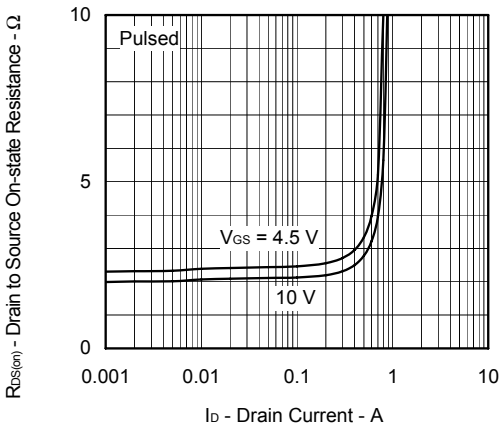
GATE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



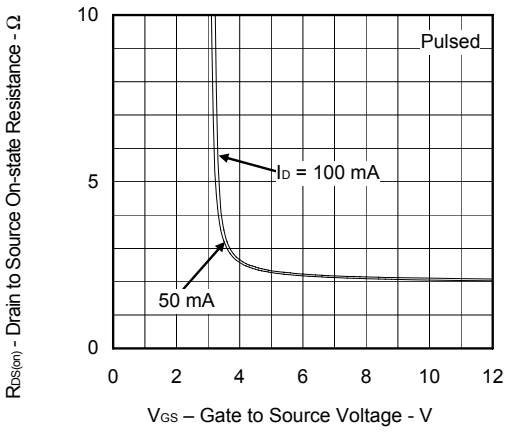
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



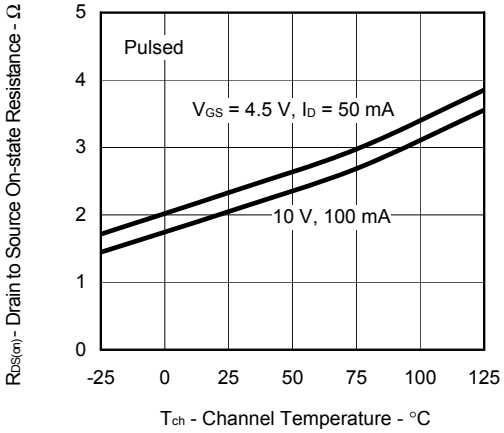
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



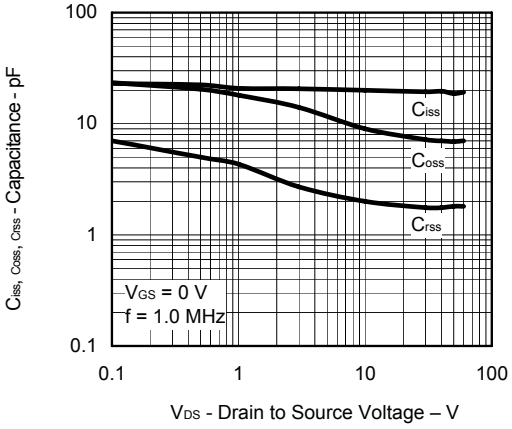
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



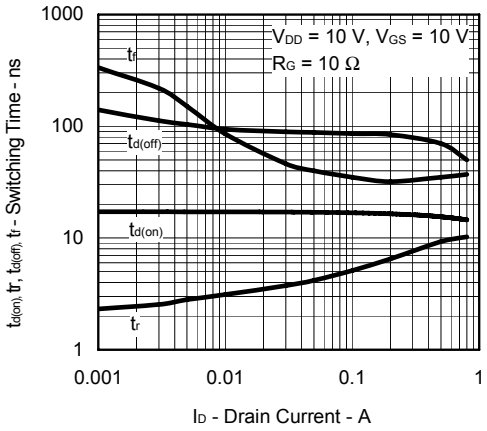
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
CHANNEL TEMPERATURE



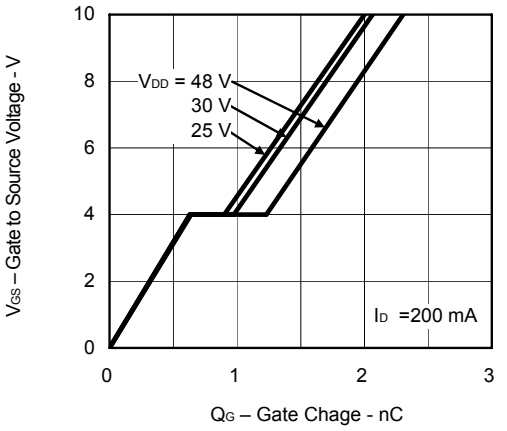
CAPACITANCE vs.
DRAIN TO SOURCE VOLTAGE



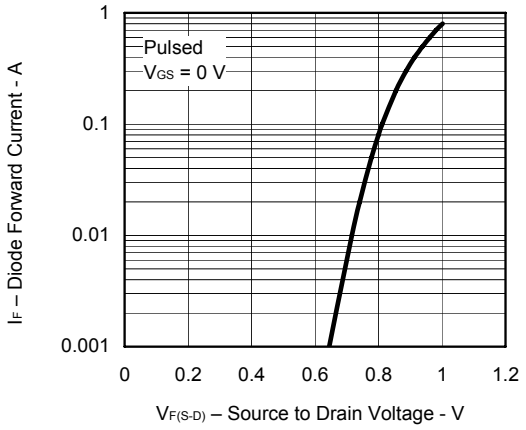
SWITCHING CHARACTERISTICS



DYNAMIC INPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



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