NP30N06QDK

60 V – 30 A – Dual N-channel Power MOS FET
Application: Automotive

R07DS1332EJ0200
Rev.2.00
May 24, 2018

Description

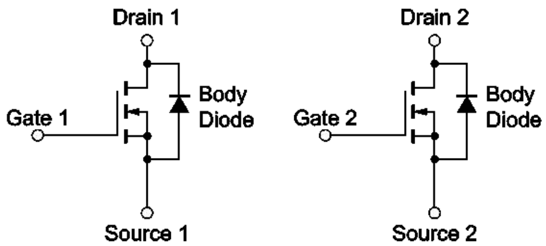
NP29N06QDK is a dual N-channel MOS Field Effect Transistor designed for high current switching applications.

Features

- Super low on-state resistance
  - $R_{DS(on)1}$ = 14 mΩ MAX. (V_{GS} = 10 V, I_D = 15 A)
  - $R_{DS(on)2}$ = 21 mΩ MAX. (V_{GS} = 4.5 V, I_D = 7.5 A)
- Low C_{iss}: C_{iss} = 1500 pF TYP. (V_{DS} = 25 V)
- Designed for automotive application and AEC-Q101 qualified
- Small size package 8-pin HSON dual

Outline

8-pin HSON dual



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.

Ordering Information

Part No.	Lead Plating	Packing		Package
NP30N06QDK-E1-AY *1	Pure Sn (Tin)	Tape 2500 p/reel	Taping (E1 type)	8-pin HSON dual
NP30N06QDK-E2-AY *1			Taping (E2 type)	

Note: *1. Pb-free (This product does not contain Pb in the external electrode)

Absolute Maximum Ratings (T_A = 25°C)

Item	Symbol	Ratings	Unit
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) (T_C = 25°C) *4	$I_{D(DC)}$	±30	A
Drain Current (pulse) *1, 4, 5	$I_{D(pulse)}$	±120	A
Total Power Dissipation (T_C = 25°C) *4	P_{T1}	59	W
Total Power Dissipation (T_A = 25°C) *2, 4	P_{T2}	1.0	W
Channel Temperature	T_{ch}	175	°C
Storage Temperature	T_{stg}	−55 to +175	°C
Repetitive Avalanche Current *3, 5	I_{AR}	19	A
Repetitive Avalanche Energy *3, 5	E_{AR}	35	mJ

Thermal Resistance

Channel to Case Thermal Resistance	$R_{th(ch-C)}$*5	2.54	°C/W
Channel to Ambient Thermal Resistance *2	$R_{th(ch-A)}$ *5	150	°C/W

Notes: *1. T_C = 25°C, PW ≤ 10 μs, Duty Cycle ≤ 1%

*2. Mounted on glass epoxy substrate of 40 mm × 40 mm × 1.6 mmt with 4% copper area (35 μm)

*3. R_G = 25 Ω, V_{GS} = 20 V → 0 V

*4. One channel operation

*5. Not subject of production test. Verified by design/characterization.

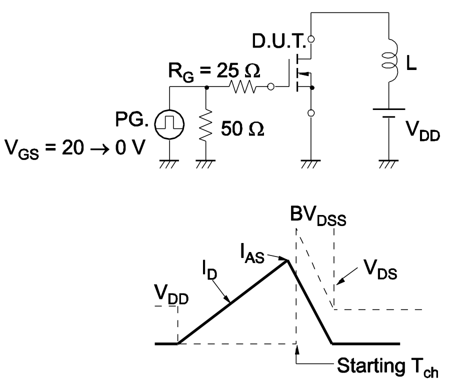
Electrical Characteristics (T_A = 25°C)

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 Threshold Voltage	$V_{GS(th)}$	1.5	2.1	2.5	V	V_{DS} = V_{GS}, I_D = 250 μA
Forward Transfer Admittance *1	$\mid y_{fs} \mid$	13	25		S	V_{DS} = 5 V, I_D = 15 A
Drain to Source On-state Resistance *1	$R_{DS(on)1}$		11.5	14	mΩ	V_{GS} = 10 V, I_D = 15 A
	$R_{DS(on)2}$		16.5	21	mΩ	V_{GS} = 4.5 V, I_D = 7.5 A
Input Capacitance *2	C_{iss}		1500	2250	pF	V_{DS} = 25 V,
Output Capacitance *2	C_{oss}		160	240	pF	V_{GS} = 0 V,
Reverse Transfer Capacitance *2	C_{rss}		50	90	pF	f = 1 MHz
Turn-on Delay Time *2	$t_{d(on)}$		15	30	ns	V_{DD} = 30 V, I_D = 15 A,
Rise Time *2	t_r		5	13	ns	V_{GS} = 10 V,
Turn-off Delay Time *2	$t_{d(off)}$		50	100	ns	R_G = 0 Ω
Fall Time *2	t_f		3	8	ns	
Total Gate Charge *2	Q_G		25	38	nC	V_{DD} = 48 V,
Gate to Source Charge	Q_{GS}		5		nC	V_{GS} = 10 V,
Gate to Drain Charge	Q_{GD}		4		nC	I_D = 30 A
Body Diode Forward Voltage *1	$V_{F(S-D)}$		0.9	1.5	V	I_F = 30 A, V_{GS} = 0 V
Reverse Recovery Time	t_{rr}		25		ns	I_F = 30 A, V_{GS} = 0 V,
Reverse Recovery Charge	Q_{rr}		26		nC	di/dt = 100 A/μs

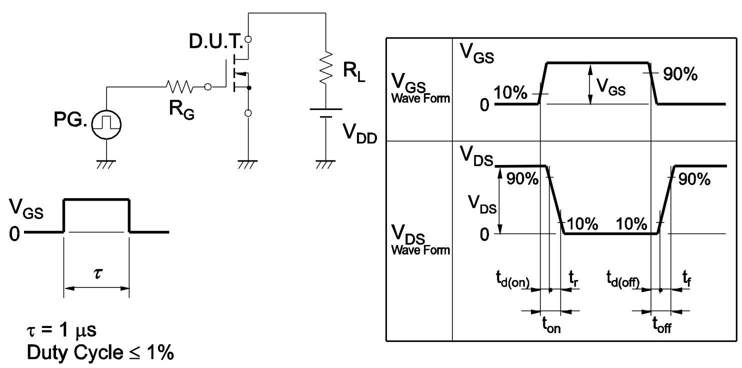
Note: *1. Pulsed test

Note: *2. Not subject of production test. Verified by design/characterization.

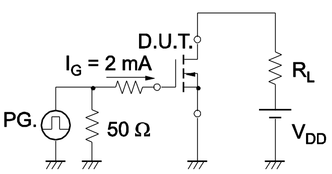
TEST CIRCUIT 1 AVALANCHE CAPABILITY



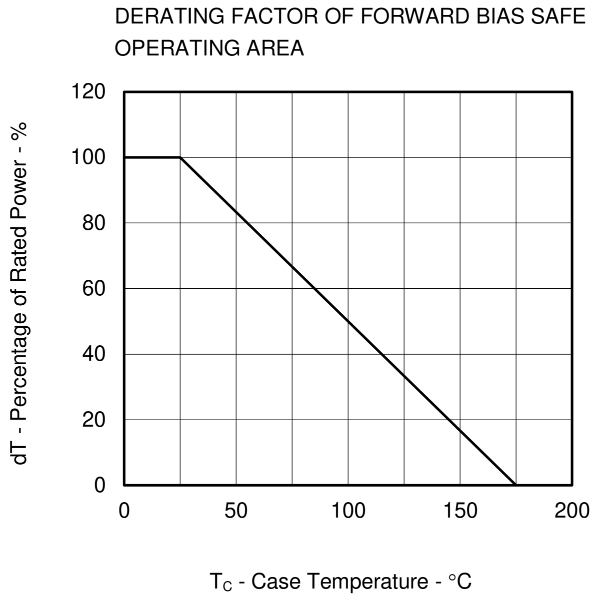
TEST CIRCUIT 2 SWITCHING TIME

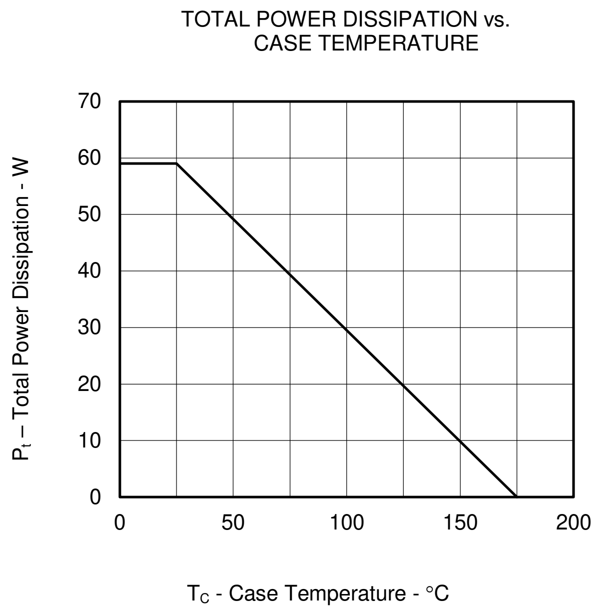


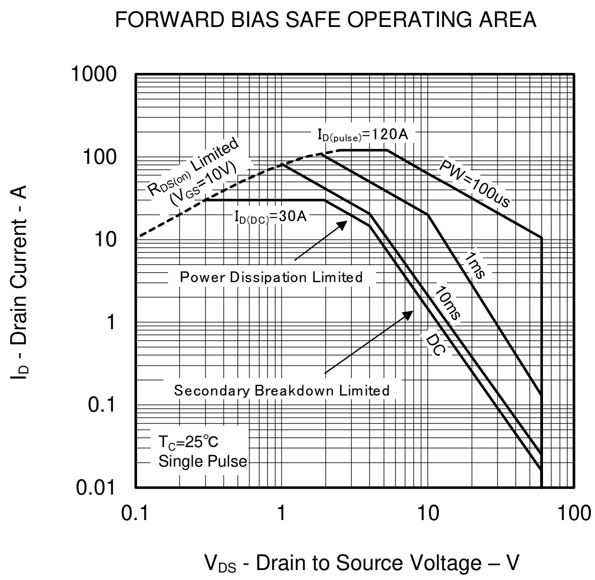
TEST CIRCUIT 3 GATE CHARGE

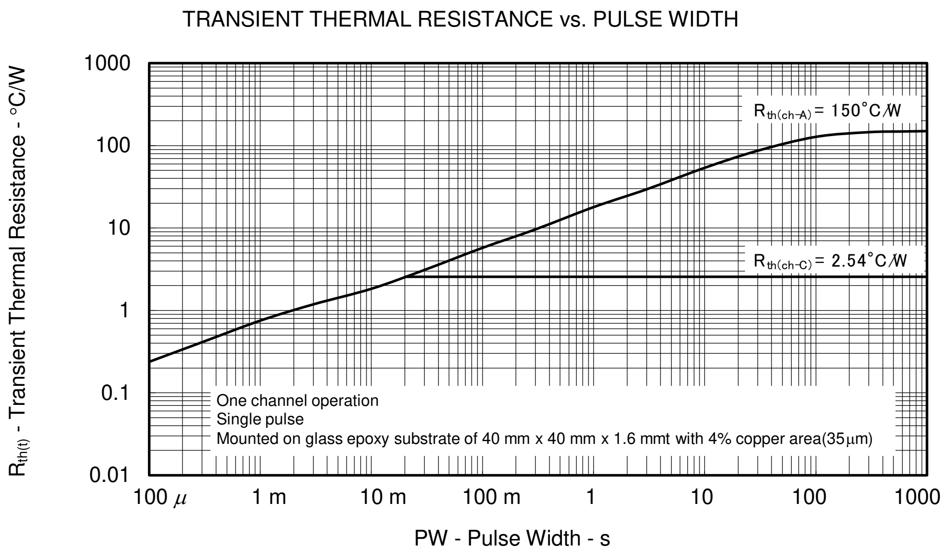


Typical Characteristics (T_A = 25°C)

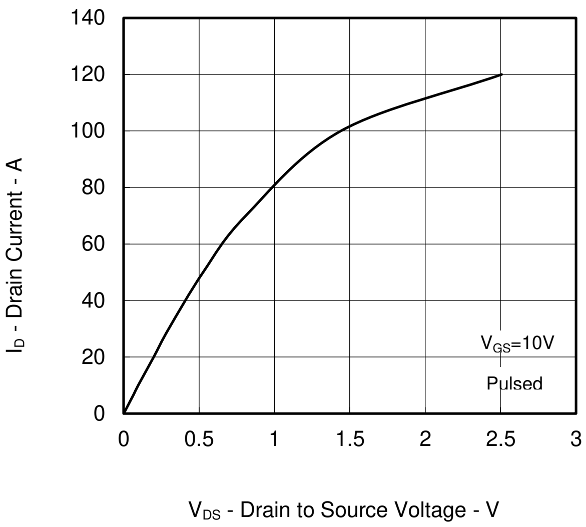




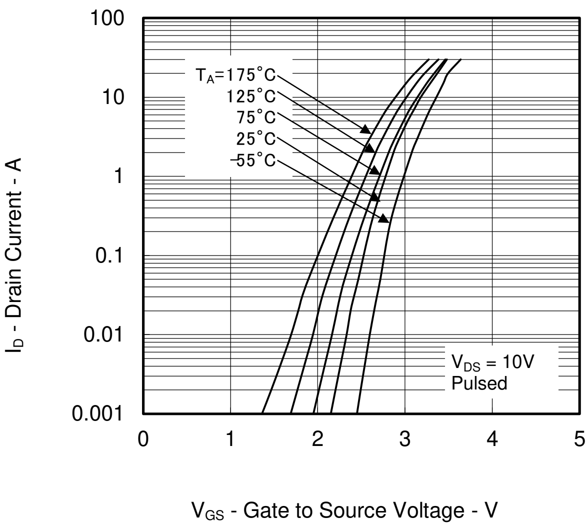




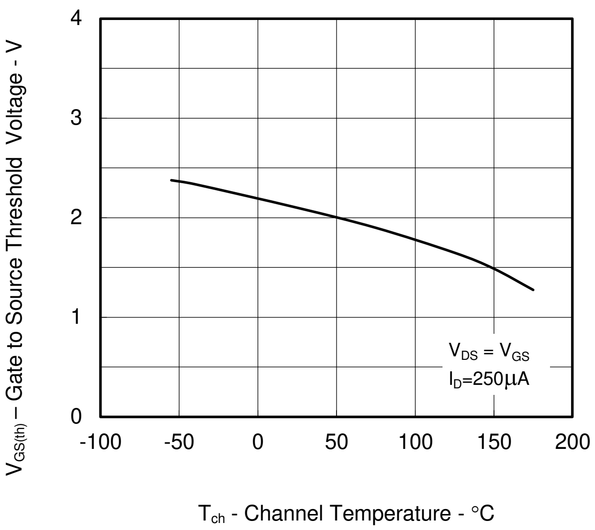
DRAIN CURRENT vs.
DRAIN TO SOURCE VOLTAGE



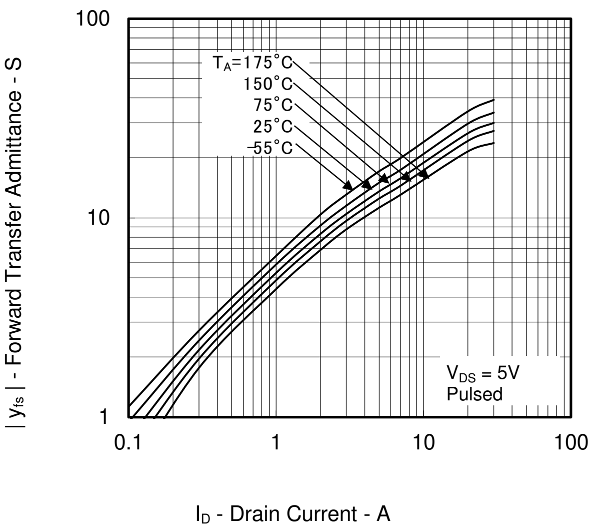
FORWARD TRANSFER CHARACTERISTICS



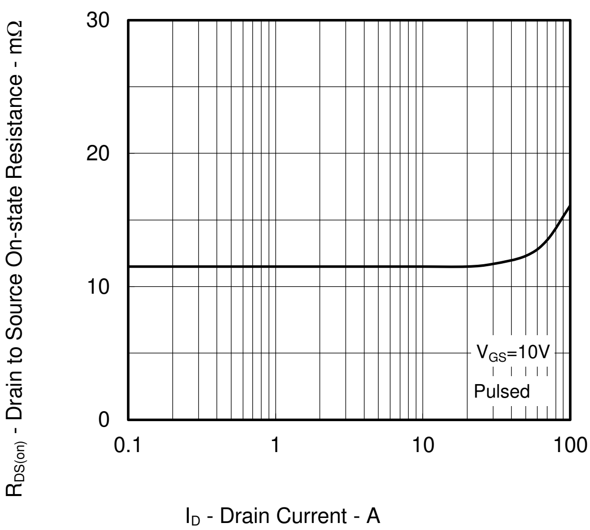
GATE TO SOURCE THRESHOLD VOLTAGE vs.
CHANNEL TEMPERATURE



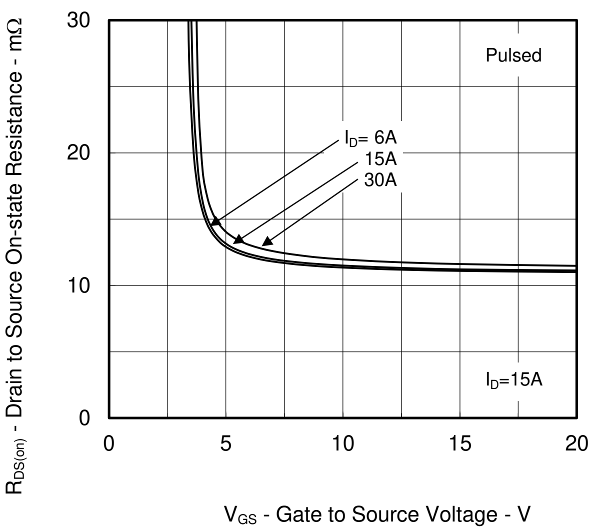
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



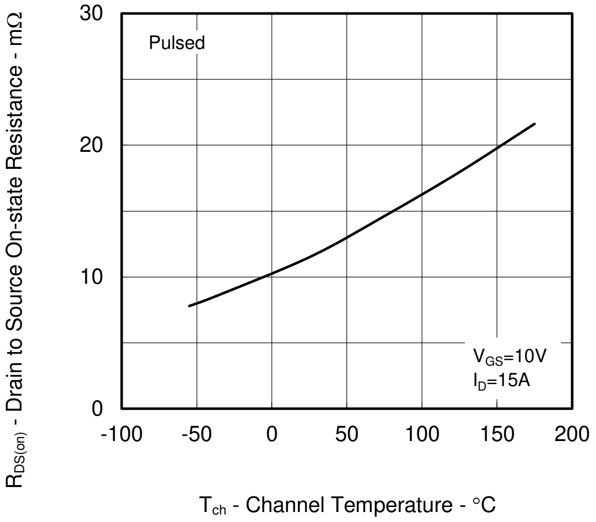
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
DRAIN CURRENT



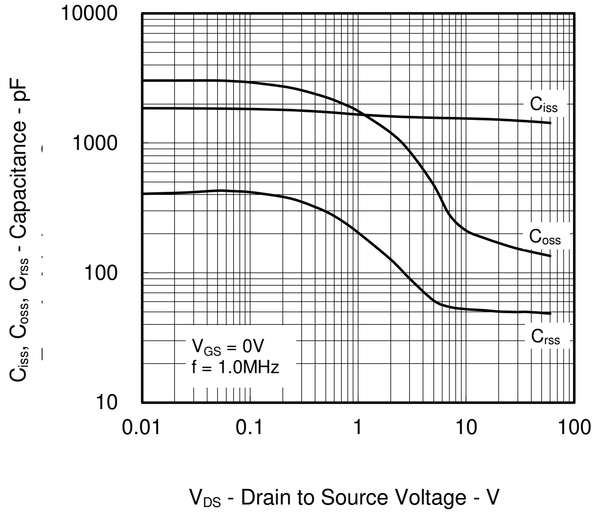
DRAIN TO SOURCE ON-STATE RESISTANCE vs.
GATE TO SOURCE VOLTAGE



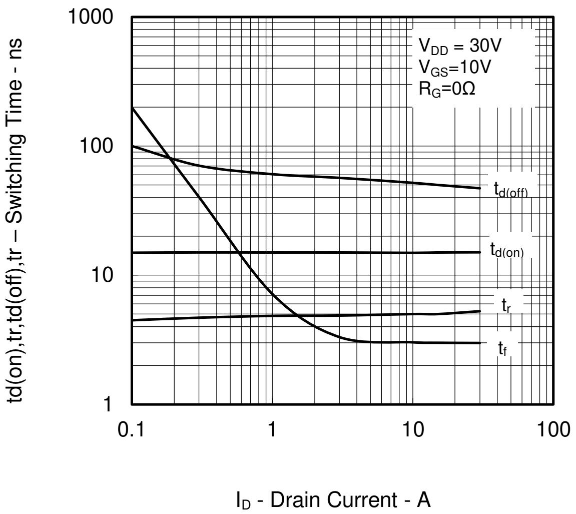
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



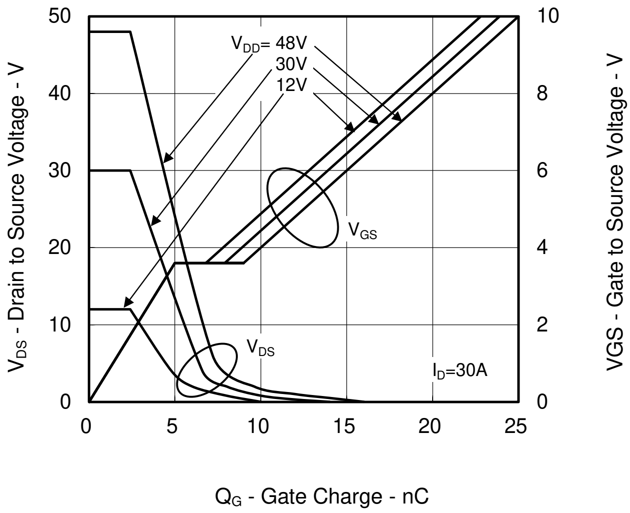
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



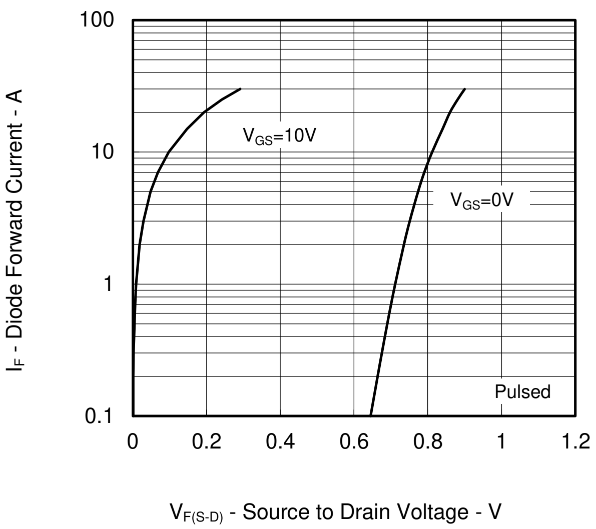
SWITCHING CHARACTERISTICS



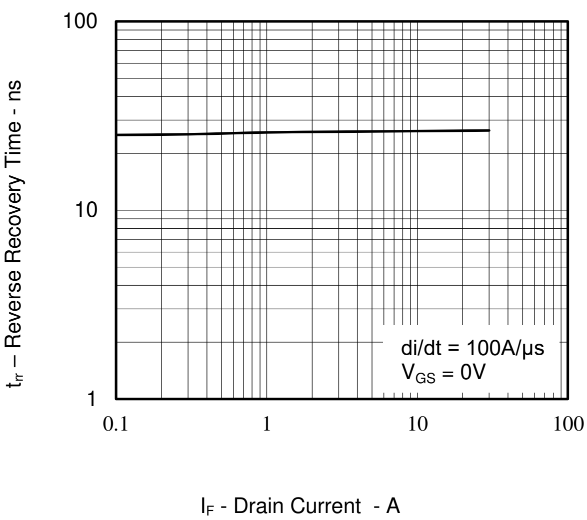
DYNAMIC INPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE



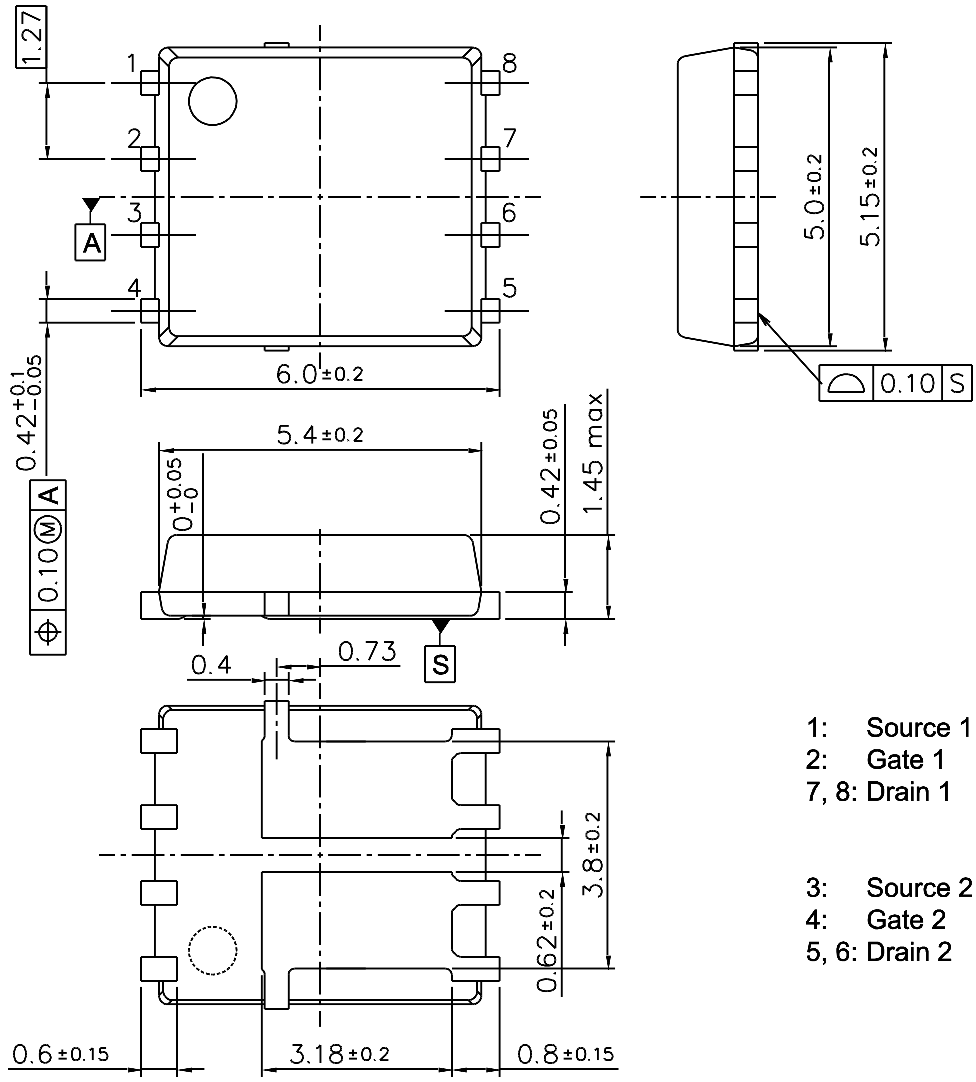
REVERSE RECOVERY TIME vs. DRAIN CURRENT



Package Drawings (Unit: mm)

8-pin HSON Dual (Mass: 0.12 g TYP.)

Renesas package code: PLSN0008DA-A



1: Source 1
2: Gate 1
7, 8: Drain 1

3: Source 2
4: Gate 2
5, 6: Drain 2

Revision History	NP30N06QDK Data Sheet

Rev.	Date	Description	
		Page	Summary
1.00	Mar 28, 2016	—	First Edition Issued
2.00	May 24 ,2018	2	Note 5 was added
		3	Note 2 was added

SALES OFFICES Renesas Electronics Corporation http://www.renesas.com

Refer to "http://www.renesas.com/" for the latest and detailed information.

Renesas Electronics America Inc.
1001 Murphy Ranch Road, Milpitas, CA 95035, U.S.A.
Tel: +1-408-432-8888, Fax: +1-408-434-5351

Renesas Electronics Canada Limited
9251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3
Tel: +1-905-237-2004

Renesas Electronics Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K
Tel: +44-1628-651-700, Fax: +44-1628-651-804

Renesas Electronics Europe GmbH
Arcadiastrasse 10, 40472 Düsseldorf, Germany
Tel: +49-211-6503-0, Fax: +49-211-6503-1327

Renesas Electronics (China) Co., Ltd.
Room 1709 Quantum Plaza, No.27 ZhichunLu, Haidian District, Beijing, 100191 P. R. China
Tel: +86-10-8235-1155, Fax: +86-10-8235-7679

Renesas Electronics (Shanghai) Co., Ltd.
Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, 200333 P. R. China
Tel: +86-21-2226-0888, Fax: +86-21-2226-0999

Renesas Electronics Hong Kong Limited
Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong
Tel: +852-2265-6688, Fax: +852 2886-9022

Renesas Electronics Taiwan Co., Ltd.
13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan
Tel: +886-2-8175-9600, Fax: +886 2-8175-9670

Renesas Electronics Singapore Pte. Ltd.
80 Bendemeer Road, Unit #06-02 Hyflux Innovation Centre, Singapore 339949
Tel: +65-6213-0200, Fax: +65-6213-0300

Renesas Electronics Malaysia Sdn.Bhd.
Unit 1207, 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 India Pvt. Ltd.
No.777C, 100 Feet Road, HAL 2nd Stage, Indiranagar, Bangalore 560 038, India
Tel: +91-80-67208700, Fax: +91-80-67208777

Renesas Electronics Korea Co., Ltd.
17F, KAMCO Yangjae Tower, 262, Gangnam-daero, Gangnam-gu, Seoul, 06265 Korea
Tel: +82-2-558-3737, Fax: +82-2-558-5338

Colophon 7.0