

NP160N055TUK

MOS FIELD EFFECT TRANSISTOR

 R07DS0592EJ0100
 Rev.1.00
 Dec 12, 2011

Description

The NP160N055TUK is N-channel MOS Field Effect Transistor designed for high current switching applications.

Features

- Super low on-state resistance
 $R_{DS(on)} = 2.10 \text{ m}\Omega \text{ MAX. (} V_{GS} = 10 \text{ V, } I_D = 80 \text{ A)}$
- Low C_{iss} : $C_{iss} = 7500 \text{ pF TYP. (} V_{DS} = 25 \text{ V)}$
- Designed for automotive application and AEC-Q101 qualified

Ordering Information

Part No.	Lead Plating	Packing		Package
NP160N055TUK-E1-AY *1	Pure Sn (Tin)	Tape 800 p/reel	Taping (E1 type)	TO-263-7pin (MP-25ZT)
NP160N055TUK-E2-AY *1			Taping (E2 type)	

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

Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Item	Symbol	Ratings	Unit
Drain to Source Voltage ($V_{GS} = 0 \text{ V}$)	V_{DSS}	55	V
Gate to Source Voltage ($V_{DS} = 0 \text{ V}$)	V_{GSS}	± 20	V
Drain Current (DC) ($T_C = 25^\circ\text{C}$)	$I_{D(DC)}$	± 160	A
Drain Current (pulse) *1	$I_{D(pulse)}$	± 640	A
Total Power Dissipation ($T_C = 25^\circ\text{C}$)	P_{T1}	250	W
Total Power Dissipation ($T_A = 25^\circ\text{C}$)	P_{T2}	1.8	W
Channel Temperature	T_{ch}	175	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to 175	$^\circ\text{C}$
Repetitive Avalanche Current *2	I_{AR}	51	A
Repetitive Avalanche Energy *2	E_{AR}	260	mJ

Notes: *1 $T_C = 25^\circ\text{C}$, $P_W \leq 10 \mu\text{s}$, Duty Cycle $\leq 1\%$

*2 $R_G = 25 \Omega$, $V_{GS} = 20 \rightarrow 0 \text{ V}$

Thermal Resistance

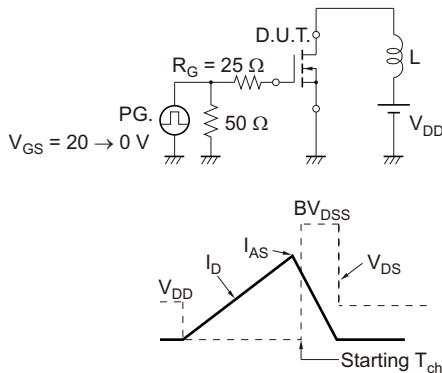
Channel to Case Thermal Resistance	$R_{th(ch-C)}$	0.60	$^\circ\text{C/W}$
Channel to Ambient Thermal Resistance	$R_{th(ch-A)}$	83.3	$^\circ\text{C/W}$

Electrical Characteristics (T_A = 25°C)

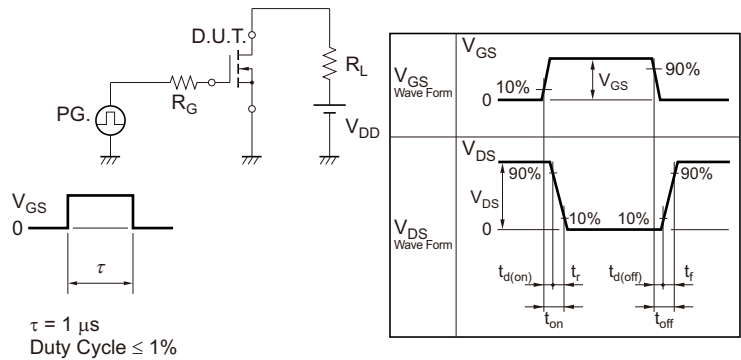
Item	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Zero Gate Voltage Drain Current	I _{DSS}	—	—	1	μA	V _{DS} = 55 V, V _{GS} = 0 V
Gate Leakage Current	I _{GSS}	—	—	±100	nA	V _{GS} = ±20 V, V _{DS} = 0 V
Gate to Source Threshold Voltage	V _{GS(th)}	2.0	3.0	4.0	V	V _{DS} = V _{GS} , I _D = 250 μA
Forward Transfer Admittance *1	y _{fs}	60	120	—	S	V _{DS} = 5 V, I _D = 80 A
Drain to Source On-state Resistance *1	R _{DS(on)}	—	1.75	2.10	mΩ	V _{GS} = 10 V, I _D = 80 A
Input Capacitance	C _{iss}	—	7500	11250	pF	V _{DS} = 25 V V _{GS} = 0 V f = 1 MHz
Output Capacitance	C _{oss}	—	770	1160	pF	
Reverse Transfer Capacitance	C _{rss}	—	270	490	pF	
Turn-on Delay Time	t _{d(on)}	—	30	70	ns	V _{DD} = 28 V, I _D = 80 A V _{GS} = 10 V R _G = 0 Ω
Rise Time	t _r	—	14	40	ns	
Turn-off Delay Time	t _{d(off)}	—	100	200	ns	
Fall Time	t _f	—	11	30	ns	
Total Gate Charge	Q _G	—	126	189	nC	V _{DD} = 44 V
Gate to Source Charge	Q _{GS}	—	32	—	nC	V _{GS} = 10 V
Gate to Drain Charge	Q _{GD}	—	31	—	nC	I _D = 160 A
Body Diode Forward Voltage *1	V _{F(S-D)}	—	0.9	1.5	V	I _F = 160 A, V _{GS} = 0 V
Reverse Recovery Time	t _{rr}	—	62	—	ns	I _F = 160 A, V _{GS} = 0 V
Reverse Recovery Charge	Q _{rr}	—	135	—	nC	di/dt = 100 A/μs

Note: *1 Pulsed test

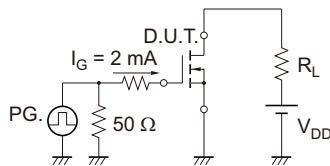
TEST CIRCUIT 1 AVALANCHE CAPABILITY



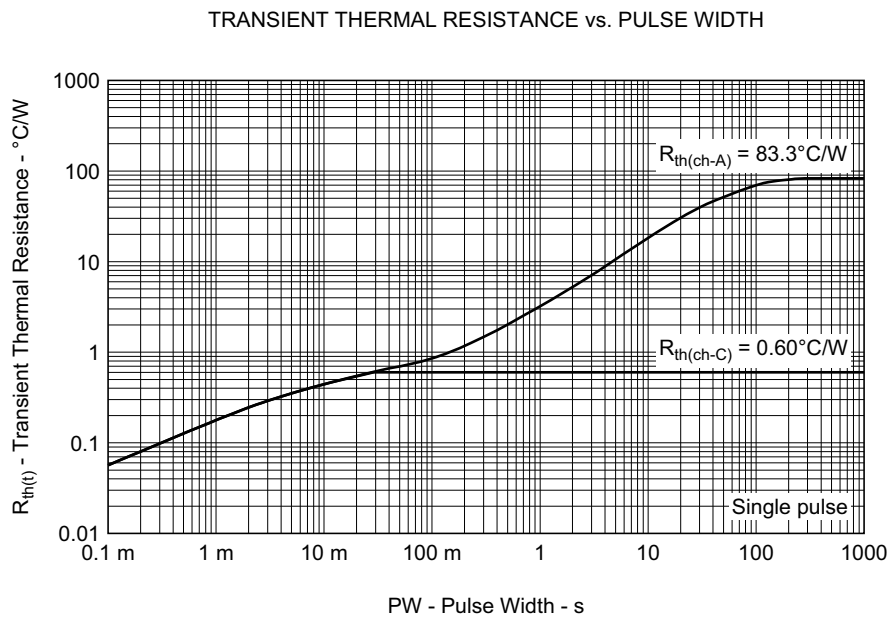
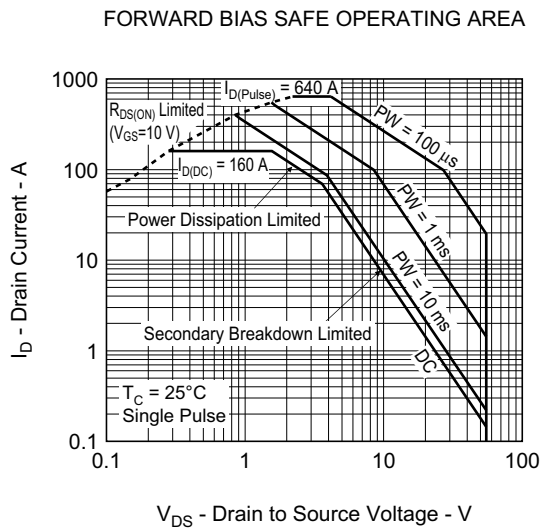
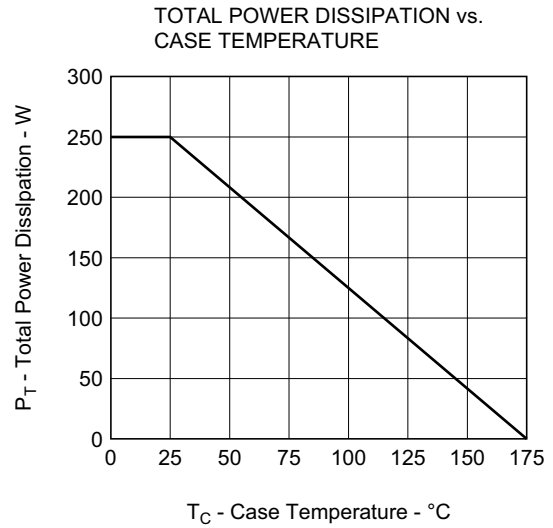
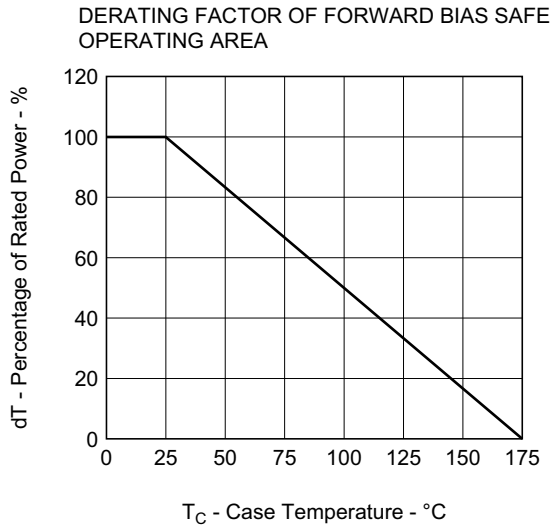
TEST CIRCUIT 2 SWITCHING TIME



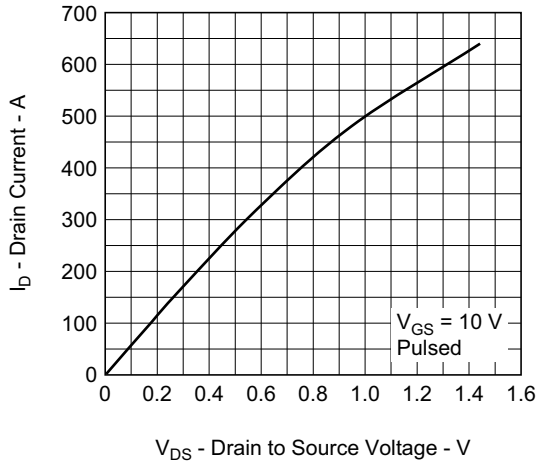
TEST CIRCUIT 3 GATE CHARGE



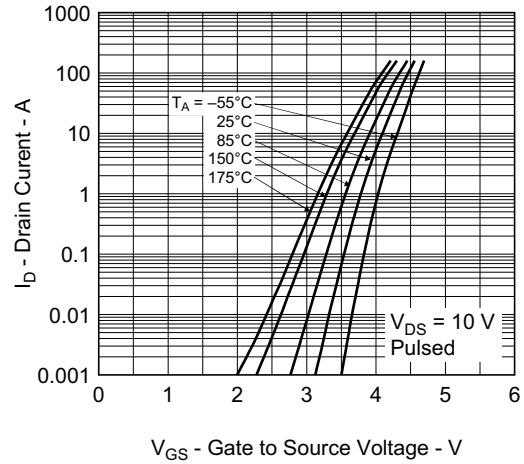
Typical Characteristics ($T_A = 25^\circ\text{C}$)



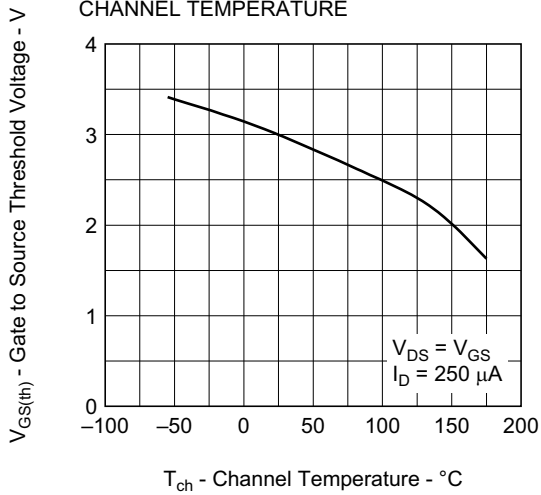
DRAIN CURRENT vs. DRAIN TO SOURCE VOLTAGE



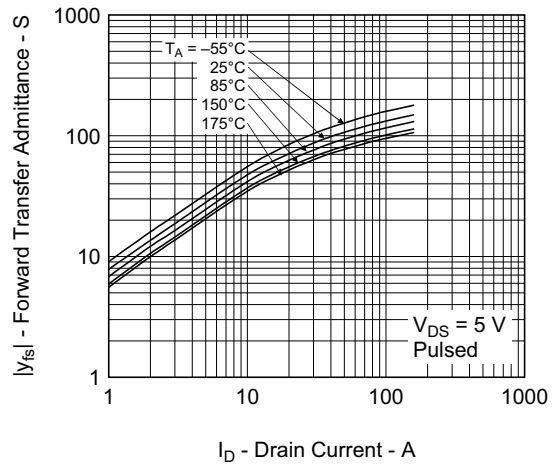
FORWARD TRANSFER CHARACTERISTICS



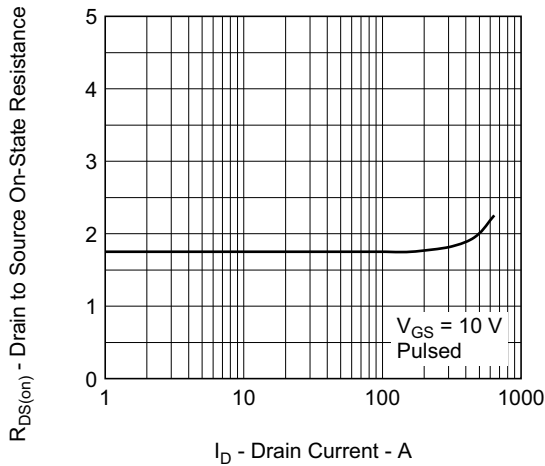
GATE TO SOURCE THRESHOLD VOLTAGE vs. CHANNEL TEMPERATURE



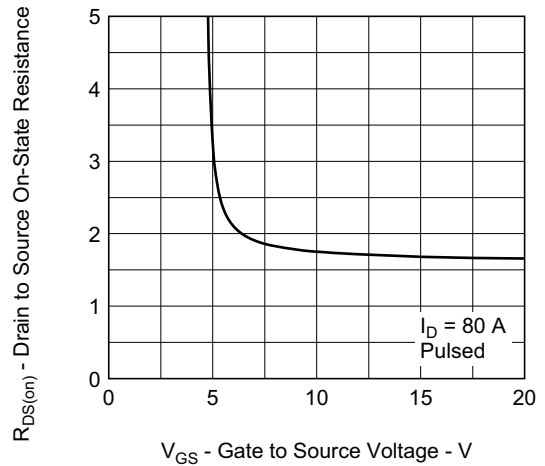
FORWARD TRANSFER ADMITTANCE vs. DRAIN CURRENT



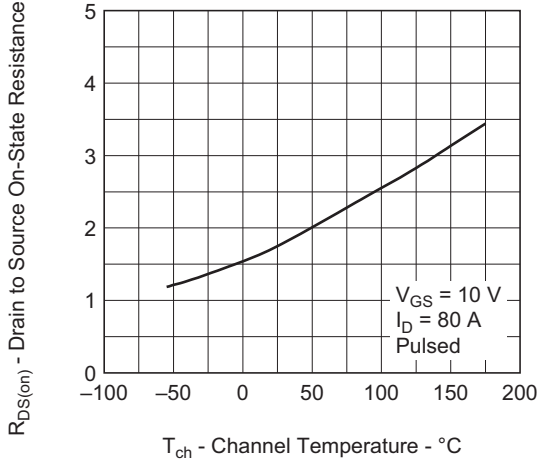
DRAIN TO SOURCE ON-STATE RESISTANCE vs. DRAIN CURRENT



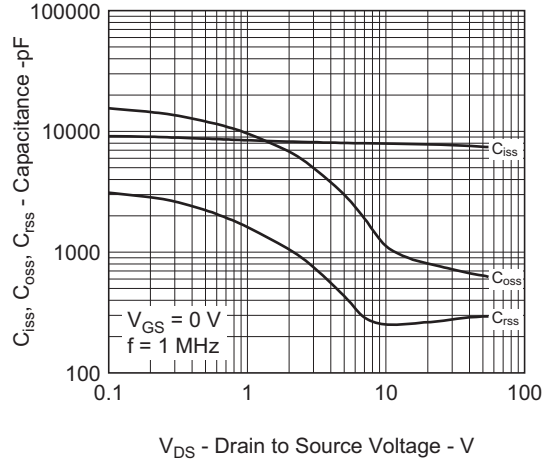
DRAIN TO SOURCE ON-STATE RESISTANCE vs. GATE TO SOURCE VOLTAGE



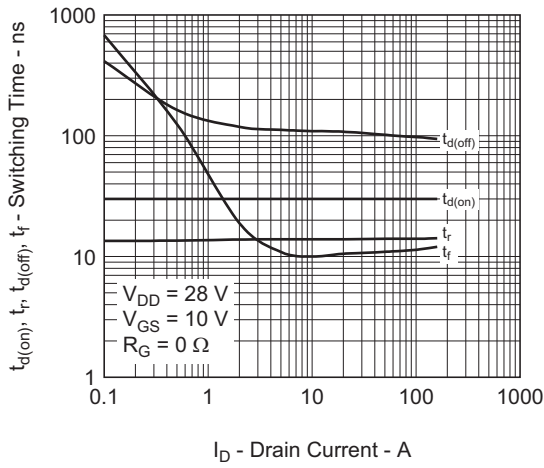
DRAIN TO SOURCE ON-STATE RESISTANCE vs. CHANNEL TEMPERATURE



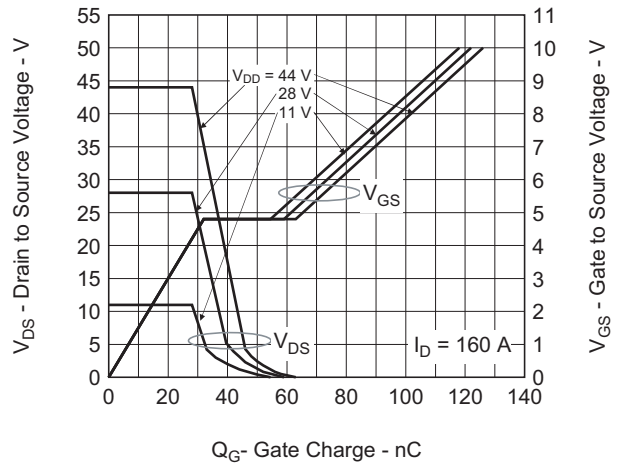
CAPACITANCE vs. DRAIN TO SOURCE VOLTAGE



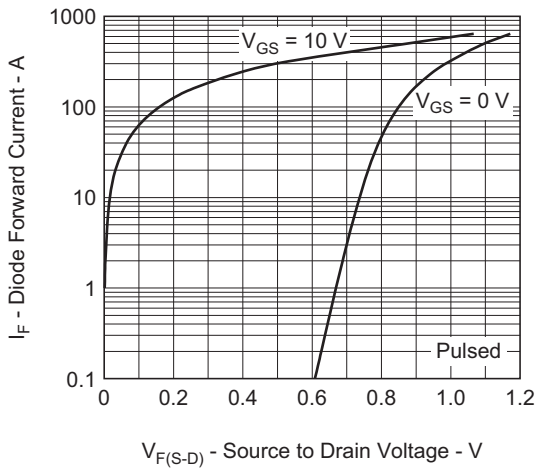
SWITCHING CHARACTERISTICS



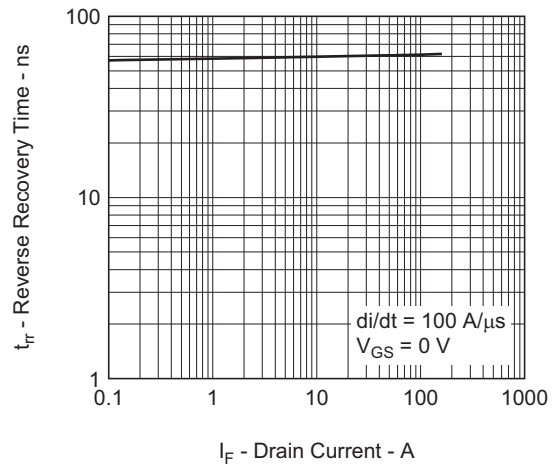
DYNAMIC INPUT/OUTPUT CHARACTERISTICS



SOURCE TO DRAIN DIODE FORWARD VOLTAGE

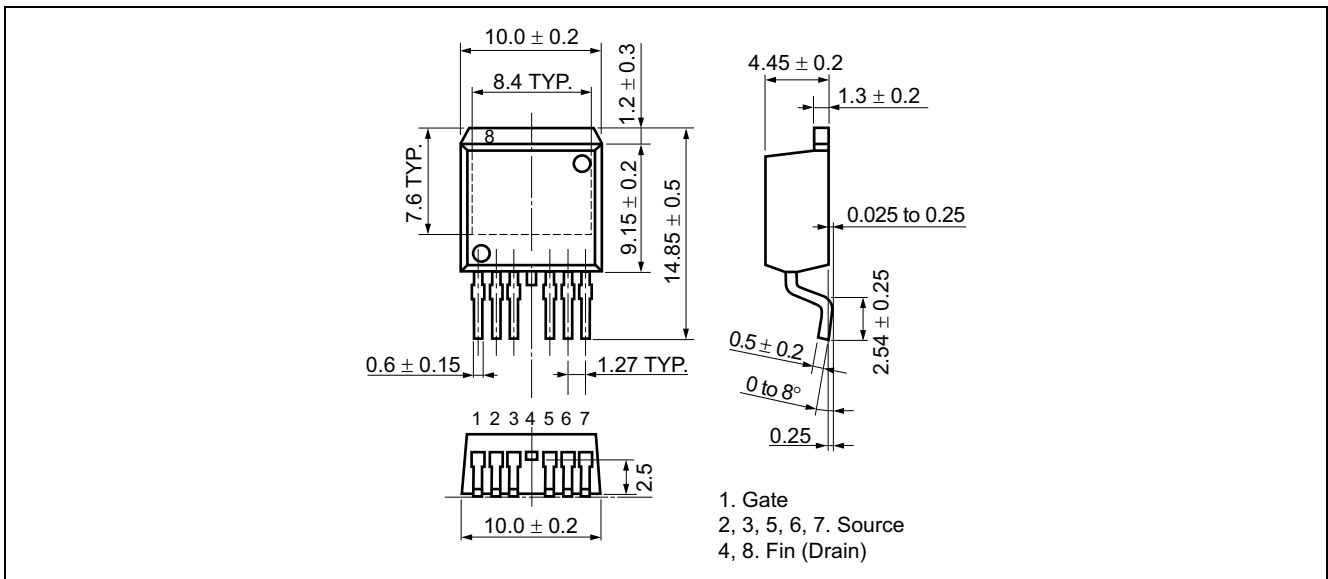


REVERSE RECOVERY TIME vs. DRAIN CURRENT

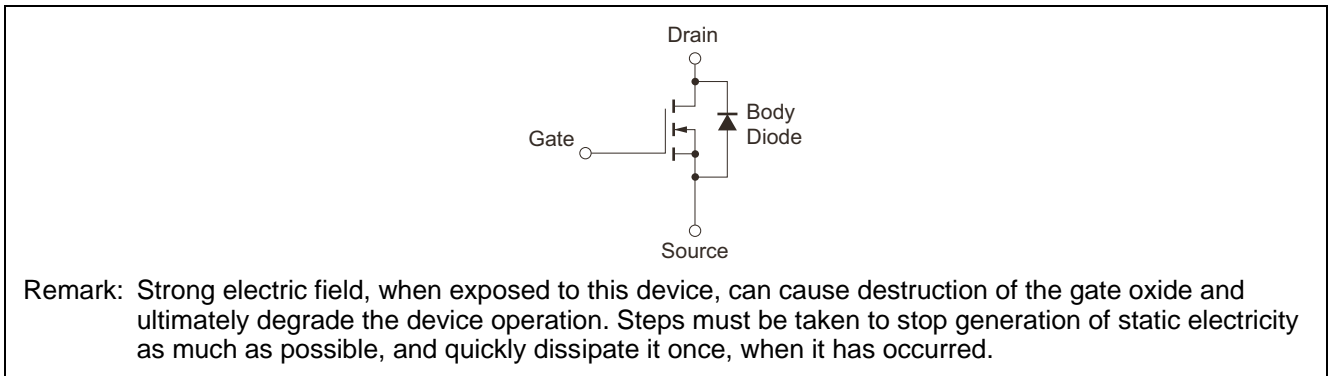


Package Drawing (Unit: mm)

TO-263-7pin (MP-25ZT) (Mass: 1.5 g TYP.)



Equivalent Circuit



Revision History	NP160N055TUK Data Sheet
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Rev.	Date	Description	
		Page	Summary
1.00	Dec 12, 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: +1-408-586-6130

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.
13F, 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, Jin 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