

NTP75N03-06, NTB75N03-06

Power MOSFET 75 Amps, 30 Volts N-Channel TO-220 and D2PAK

This 10 V_{GS} gate drive vertical Power MOSFET is a general purpose part that provides the “best of design” available today in a low cost power package. Avalanche energy issues make this part an ideal design in. The drain-to-source diode has a ideal fast but soft recovery.

Features

- Ultra-Low R_{DS(on)}, Single Base, Advanced Technology
- SPICE Parameters Available
- Diode is Characterized for Use in Bridge Circuits
- I_{DSS} and V_{DS(on)} Specified at Elevated Temperatures
- High Avalanche Energy Specified
- ESD JEDAC Rated HBM Class 1, MM Class B, CDM Class 0

Typical Applications

- Power Supplies
- Inductive Loads
- PWM Motor Controls
- Replaces MTP1306 and MTB1306 in Many Applications

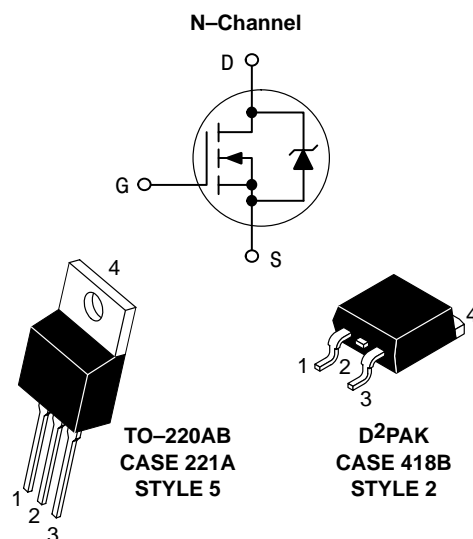


ON Semiconductor™

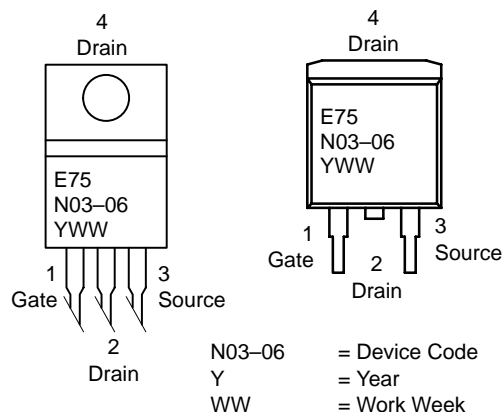
<http://onsemi.com>

**75 AMPERES
30 VOLTS**

R_{DS(on)} = 6.5 mΩ



MARKING DIAGRAMS & PIN ASSIGNMENTS



ORDERING INFORMATION

Device	Package	Shipping
NTP75N03-06	TO-220	50 Units/Rail
NTB75N03-06	D2PAK	50 Units/Rail
NTB75N03-06T4	D2PAK	800 Tape & Reel

NTP75N03-06, NTB75N03-06

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	30	Vdc
Drain-to-Gate Voltage ($R_{GS} = 10\text{ M}\Omega$)	V_{DGB}	30	Vdc
Gate-to-Source Voltage – Continuous	V_{GS}	± 20	Vdc
Non-repetitive ($t_p \leq 10\text{ ms}$)	V_{GS}	± 24	Vdc
Drain Current – Continuous @ $T_A = 25^\circ\text{C}$ – Continuous @ $T_A = 100^\circ\text{C}$ – Single Pulse ($t_p \leq 10\text{ }\mu\text{s}$)	I_D I_D I_{DM}	75 59 225	Adc Adc Apk
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C Total Power Dissipation @ $T_A = 25^\circ\text{C}$ (Note 1.)	P_D	150 1.0 2.5	W W/ $^\circ\text{C}$ W
Operating and Storage Temperature Range	T_J and T_{stg}	-55 to 150	$^\circ\text{C}$
Single Pulse Drain-to-Source Avalanche Energy – Starting $T_J = 25^\circ\text{C}$ ($V_{DD} = 38\text{ Vdc}$, $V_{GS} = 10\text{ Vdc}$, $L = 1\text{ mH}$, $I_L(pk) = 55\text{ A}$, $V_{DS} = 40\text{ Vdc}$)	E_{AS}	1500	mJ
Thermal Resistance – Junction-to-Case – Junction-to-Ambient – Junction-to-Ambient (Note 1.)	$R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	1.0 62.5 50	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

1. When surface mounted to an FR4 board using the minimum recommended pad size.

NTP75N03-06, NTB75N03-06

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ.	Max	Unit
----------------	--------	-----	------	-----	------

OFF CHARACTERISTICS

Drain-Source Breakdown Voltage (Note 2.) (V _{GS} = 0 Vdc, I _D = 250 μ Adc) Temperature Coefficient (Negative)	V _{(BR)DSS}	30	— -57	— —	Vdc mV°C
Zero Gate Voltage Drain Current (V _{DS} = 30 Vdc, V _{GS} = 0 Vdc) (V _{DS} = 30 Vdc, V _{GS} = 0 Vdc, T _J = 150°C)	I _{DSS}	— —	— —	1.0 10	μ Adc
Gate-Body Leakage Current (V _{GS} = \pm 20 Vdc, V _{DS} = 0 Vdc)	I _{GSS}	—	—	\pm 100	nAdc

ON CHARACTERISTICS (Note 2.)

Gate Threshold Voltage (Note 2.) (V _{DS} = V _{GS} , I _D = 250 μ Adc) Threshold Temperature Coefficient (Negative)	V _{GS(th)}	1.0 —	1.6 -6	2.0 —	Vdc mV°C
Static Drain-to-Source On-Resistance (Note 2.) (V _{GS} = 10 Vdc, I _D = 37.5 Adc)	R _{DS(on)}	—	5.3	6.5	m Ω
Static Drain-to-Source On Resistance (Note 2.) (V _{GS} = 10 Vdc, I _D = 75 Adc) (V _{GS} = 10 Vdc, I _D = 37.5 Adc, T _J = 125°C)	V _{DS(on)}	— —	0.53 0.35	0.68 0.50	Vdc
Forward Transconductance (Notes 2. & 4.) (V _{DS} = 3 Vdc, I _D = 20 Adc)	g _{FS}	—	58	—	Mhos

DYNAMIC CHARACTERISTICS (Note 4.)

Input Capacitance	(V _{DS} = 25 Vdc, V _{GS} = 0, f = 1.0 MHz)	C _{iss}	—	4398	5635	pF
Output Capacitance		C _{oss}	—	1160	1894	
Transfer Capacitance		C _{rss}	—	317	430	

SWITCHING CHARACTERISTICS (Notes 3. & 4.)

Turn-On Delay Time	(V _{GS} = 5.0 Vdc, V _{DD} = 20 Vdc, I _D = 75 Adc, R _G = 4.7 Ω) (Note 2.)	t _{d(on)}	—	31	48	ns
Rise Time		t _r	—	510	986	
Turn-Off Delay Time		t _{d(off)}	—	99	120	
Fall Time		t _f	—	203	300	
Gate Charge	(V _{GS} = 5.0 Vdc, I _D = 75 Adc, V _{DS} = 24 Vdc) (Note 2.)	Q _T	—	52	122	nC
		Q ₁	—	6.6	28	
		Q ₂	—	28	66	

SOURCE-DRAIN DIODE CHARACTERISTICS

Forward On–Voltage	(I _S = 75 Adc, V _{GS} = 0 Vdc) (I _S = 75 Adc, V _{GS} = 0 Vdc, T _J = 125°C) (Note 2.)	V _{SD}	– –	1.19 1.09	1.25 –	Vdc
Reverse Recovery Time (Note 4.)	(I _S = 75 Adc, V _{GS} = 0 Vdc dI _S /dt = 100 A/μs) (Note 2.)	t _{rr}	–	37	–	ns
		t _a	–	20	–	
Reverse Recovery Stored Charge (Note 4.)		t _b	–	17	–	μC
		Q _{RR}	–	0.023	–	

- Pulse Test: Pulse Width \leq 300 μ s, Duty Cycle \leq 2%.
- Switching characteristics are independent of operating junction temperatures.
- From characterization test data.

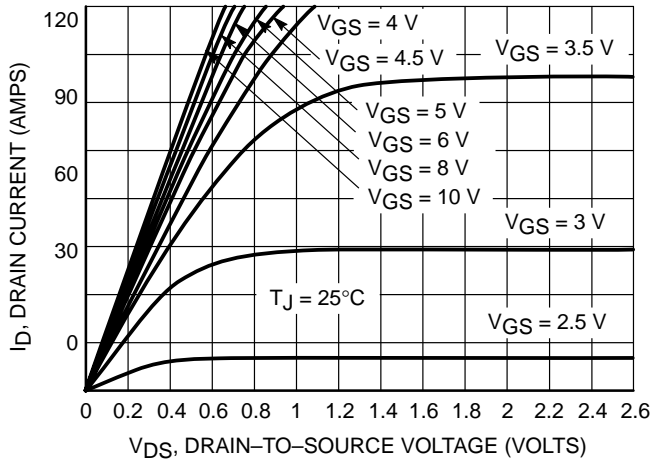


Figure 1. On-Region Characteristics

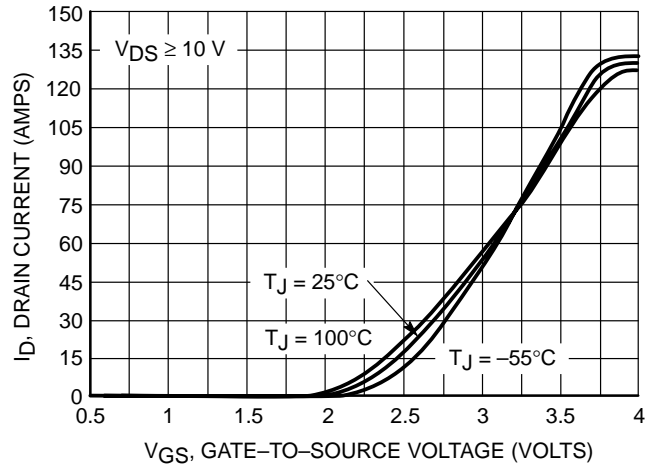


Figure 2. Transfer Characteristics

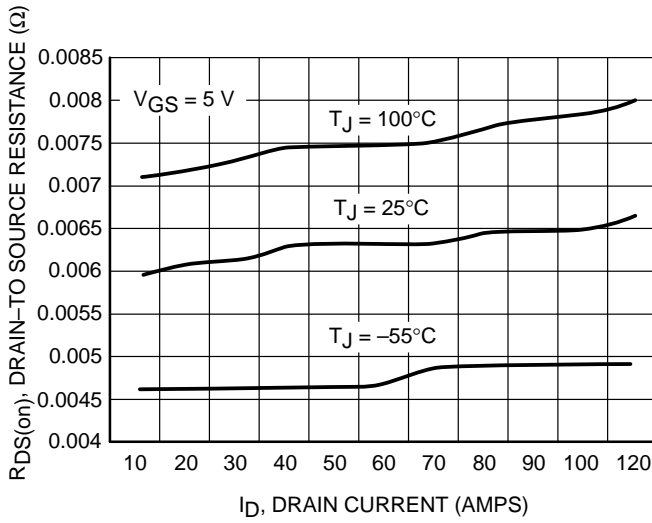


Figure 3. On-Resistance vs. Drain Current and Temperature

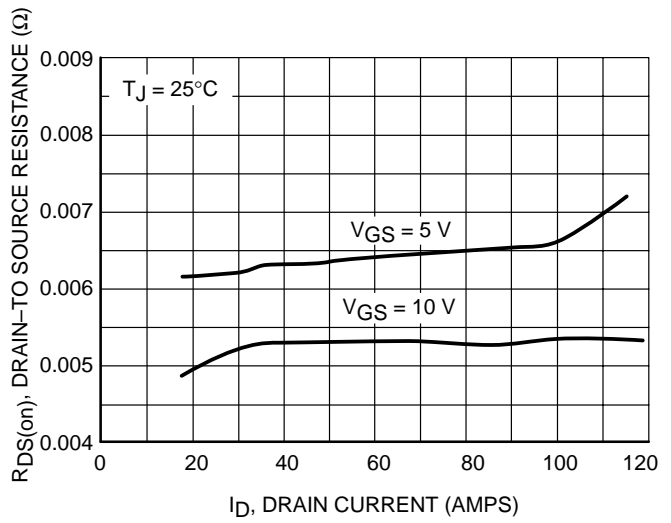


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

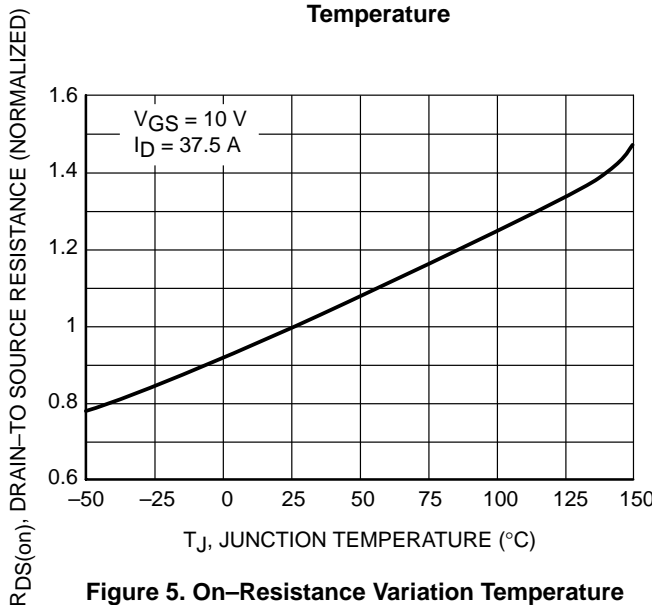


Figure 5. On-Resistance Variation Temperature

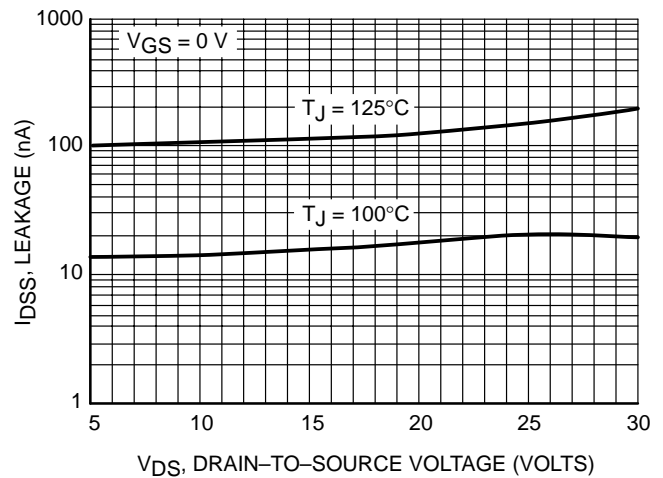


Figure 6. Drain-to-Source Leakage Current vs. Voltage

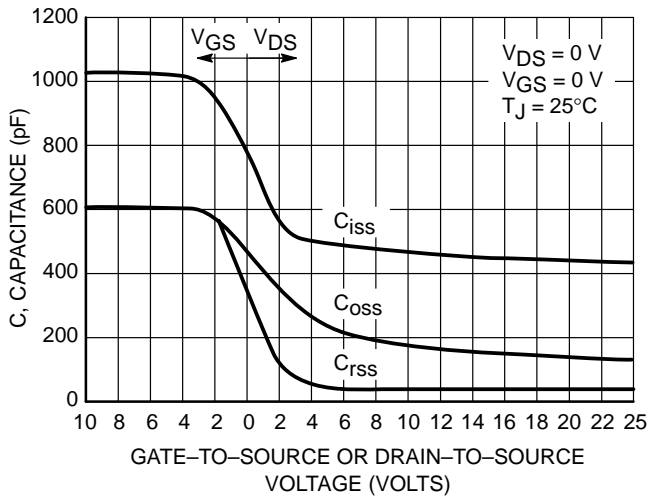


Figure 7. Capacitance Variation

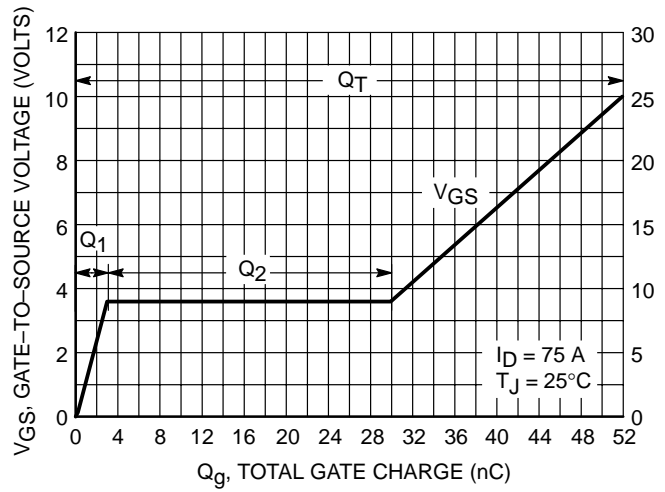


Figure 8. Gate-to-Source Voltage vs. Total Charge

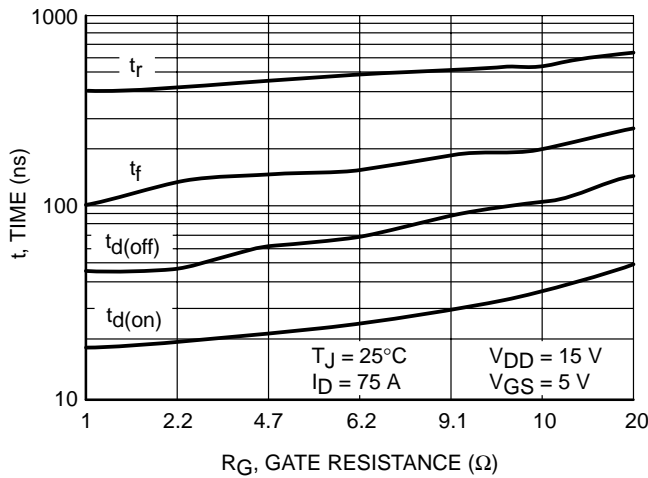


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

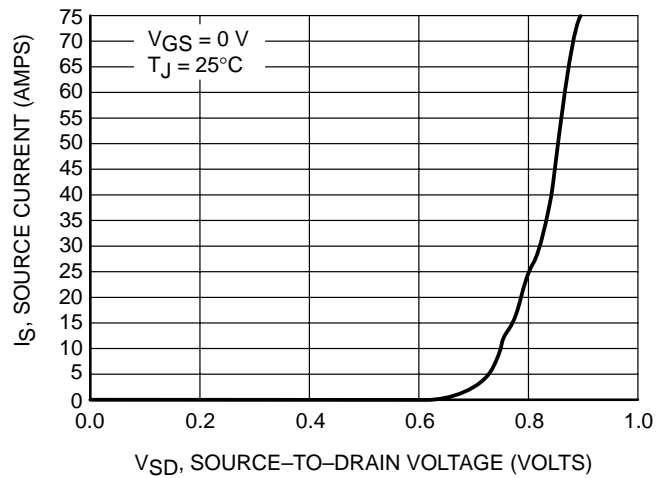


Figure 10. Diode Forward Voltage vs. Current

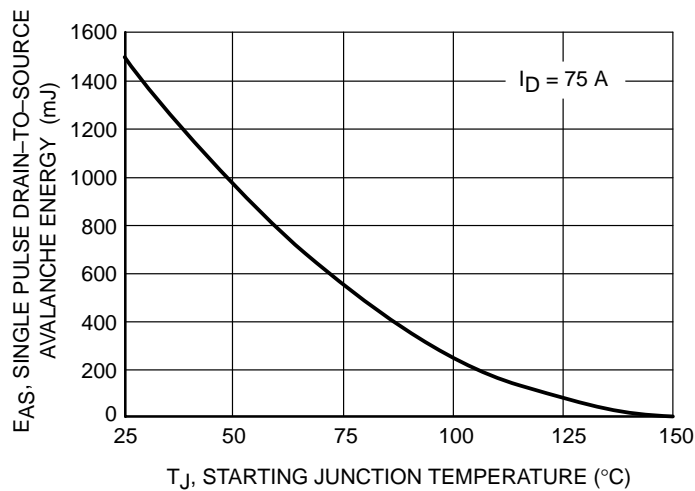
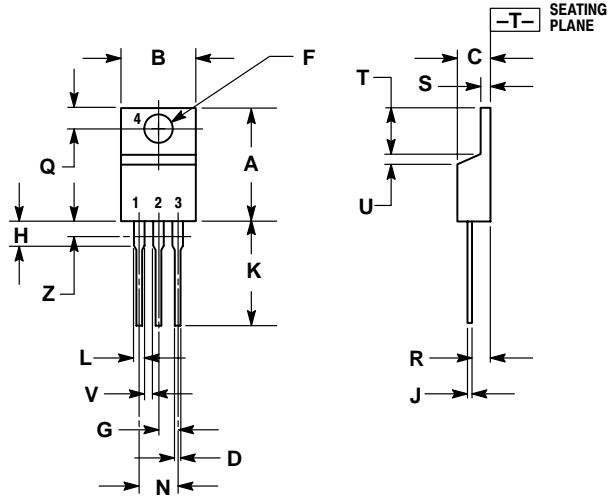


Figure 11. Maximum Avalanche Energy vs. Starting Junction Temperature

PACKAGE DIMENSIONS

TO-220 THREE-LEAD
TO-220AB
CASE 221A-09
ISSUE AA



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

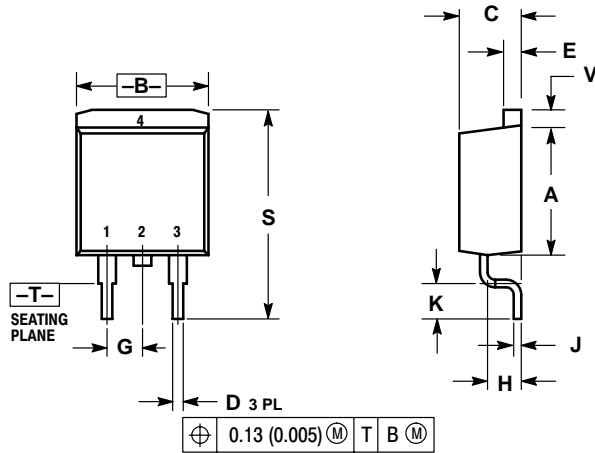
STYLE 5:

- PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

NTP75N03-06, NTB75N03-06

PACKAGE DIMENSIONS


D2PAK
CASE 418B-03
ISSUE D



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.340	0.380	8.64	9.65
B	0.380	0.405	9.65	10.29
C	0.160	0.190	4.06	4.83
D	0.020	0.035	0.51	0.89
E	0.045	0.055	1.14	1.40
G	0.100 BSC		2.54 BSC	
H	0.080	0.110	2.03	2.79
J	0.018	0.025	0.46	0.64
K	0.090	0.110	2.29	2.79
S	0.575	0.625	14.60	15.88
V	0.045	0.055	1.14	1.40

STYLE 2:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN

ON Semiconductor and  are trademarks of Semiconductor Components Industries, LLC (SCILLC). SCILLC reserves the right to make changes without further notice to any products herein. SCILLC makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does SCILLC assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. "Typical" parameters which may be provided in SCILLC data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. SCILLC does not convey any license under its patent rights nor the rights of others. SCILLC products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the SCILLC product could create a situation where personal injury or death may occur. Should Buyer purchase or use SCILLC products for any such unintended or unauthorized application, Buyer shall indemnify and hold SCILLC and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that SCILLC was negligent regarding the design or manufacture of the part. SCILLC is an Equal Opportunity/Affirmative Action Employer.

PUBLICATION ORDERING INFORMATION

NORTH AMERICA Literature Fulfillment:

Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303-675-2175 or 800-344-3860 Toll Free USA/Canada
Fax: 303-675-2176 or 800-344-3867 Toll Free USA/Canada
Email: ONlit@hibbertco.com
Fax Response Line: 303-675-2167 or 800-344-3810 Toll Free USA/Canada

N. American Technical Support: 800-282-9855 Toll Free USA/Canada

EUROPE: LDC for ON Semiconductor – European Support

German Phone: (+1) 303-308-7140 (Mon-Fri 2:30pm to 7:00pm CET)
Email: ONlit-german@hibbertco.com

French Phone: (+1) 303-308-7141 (Mon-Fri 2:00pm to 7:00pm CET)
Email: ONlit-french@hibbertco.com

English Phone: (+1) 303-308-7142 (Mon-Fri 12:00pm to 5:00pm GMT)
Email: ONlit@hibbertco.com

EUROPEAN TOLL-FREE ACCESS*: 00-800-4422-3781

*Available from Germany, France, Italy, UK, Ireland

CENTRAL/SOUTH AMERICA:

Spanish Phone: 303-308-7143 (Mon-Fri 8:00am to 5:00pm MST)
Email: ONlit-spanish@hibbertco.com

Toll-Free from Mexico: Dial 01-800-288-2872 for Access –
then Dial 866-297-9322

ASIA/PACIFIC: LDC for ON Semiconductor – Asia Support

Phone: 303-675-2121 (Tue-Fri 9:00am to 1:00pm, Hong Kong Time)
Toll Free from Hong Kong & Singapore:
001-800-4422-3781

Email: ONlit-asia@hibbertco.com

JAPAN: ON Semiconductor, Japan Customer Focus Center

4-32-1 Nishi-Gotanda, Shinagawa-ku, Tokyo, Japan 141-0031
Phone: 81-3-5740-2700
Email: r14525@onsemi.com

ON Semiconductor Website: <http://onsemi.com>

For additional information, please contact your local
Sales Representative.