NTD6600N

Power MOSFET

100 V, 12 A, N−Channel, Logic Level DPAK

Features

- Source−to−Drain Diode Recovery Time Comparable to a Discrete Fast Recovery Diode
- Avalanche Energy Specified
- Logic Level
- Pb−Free Packages are Available

Typical Applications

- PWM Motor Controls
- Power Supplies
- Converters

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	100	Vdc
Drain−to−Source Voltage (R_{GS} = 1.0 MΩ)	V_{DGR}	100	Vdc
Gate−to−Source Voltage − Continuous	V_{GS}	± 20	Vdc
Drain Current − Continuous @ T_A = 25°C − Continuous @ T_A =100°C − Pulsed (Note 3)	I_D I_D I_{DM}	12 9.0 44	Adc Apk
Total Power Dissipation Derate above 25°C Total Power Dissipation @ T_A = 25°C (Note 1) Total Power Dissipation @ T_A = 25°C (Note 2)	P_D	56.6 0.38 1.76 1.28	W W/°C W W
Operating and Storage Temperature Range	T_J, T_{stg}	−55 to +175	°C
Single Pulse Drain−to−Source Avalanche Energy − Starting T_J = 25°C (V_{DD} = 50 Vdc, V_{GS} = 5.0 Vdc, I_L = 12 Apk, L = 1.0 mH, R_G = 25 Ω)	E_{AS}	72	mJ
Thermal Resistance − Junction−to−Case − Junction−to−Ambient (Note 1) − Junction−to−Ambient (Note 2)	 $R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	 2.65 85 117	°C/W
Maximum Temperature for Soldering Purposes, (1/8″ from case for 10 s)	T_L	260	°C

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. When surface mounted to an FR4 board using 0.5 sq in pad size.
2. When surface mounted to an FR4 board using the minimum recommended pad size.
3. Pulse Test: Pulse Width = 10 μs, Duty Cycle = 2%.

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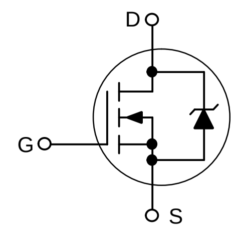
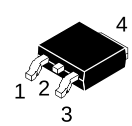
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
100 V	118 mΩ @ 5.0 V	12 A

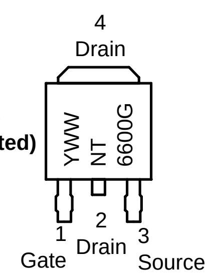
N−Channel

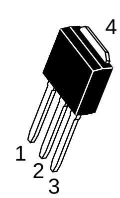


MARKING DIAGRAMS

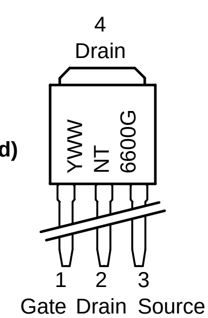


DPAK
CASE 369C
(Surface Mounted)
STYLE 2





DPAK−3
CASE 369D
(Straight Lead)
STYLE 2



Y	= Year
WW	= Work Week
NT6600	= Device Code
G	= Pb−Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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

Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage (V_{GS} = 0 Vdc, I_D = 250 μAdc)		$V_{(BR)DSS}$	100	−	−	Vdc
Zero Gate Voltage Drain Current (V_{GS} = 0 Vdc, V_{DS} = 100 Vdc, T_J = 25°C) (V_{GS} = 0 Vdc, V_{DS} = 100 Vdc, T_J = 125°C)		I_{DSS}	− −	− −	1.0 10	μAdc
Gate−Body Leakage Current (V_{GS} = ±20 Vdc, V_{DS} = 0)		I_{GSS}	−	−	±100	nAdc
ON CHARACTERISTICS						
Gate Threshold Voltage V_{DS} = $V_{GS,}$ I_D = 250 μAdc) Temperature Coefficient (Negative)		$V_{GS(th)}$	1.0 −	1.5 −4.4	2.0 −	Vdc mV/°C
Static Drain−to−Source On−State Resistance (V_{GS} = 5.0 Vdc, I_D = 6.0 Adc)		$R_{DS(on)}$	−	118	146	mΩ
Drain−to−Source On−Voltage (V_{GS} = 5.0 Vdc, I_D = 12 Adc)		$V_{DS(on)}$	−	1.5	2.2	Vdc
Forward Transconductance (V_{DS} = 10 Vdc, I_D = 6.0 Adc)		g_{FS}	−	10	−	mhos
DYNAMIC CHARACTERISTICS						
Input Capacitance	(V_{DS} = 25 Vdc, V_{GS} = 0 Vdc, f = 1.0 MHz)	C_{iss}	−	463	700	pF
Output Capacitance		C_{oss}	−	116	225	
Reverse Transfer Capacitance		C_{rss}	−	36	75	
SWITCHING CHARACTERISTICS (Notes 4 & 5)						
Turn−On Delay Time	(V_{DD} = 80 Vdc, I_D = 6.0 Adc, V_{GS} = 5.0 Vdc, R_G = 9.1 Ω)	$t_{d(on)}$	−	10.5	20	ns
Rise Time		t_r	−	75	140	
Turn−Off Delay Time		$t_{d(off)}$	−	26	40	
Fall Time		t_f	−	50	90	
Total Gate Charge	(V_{DS} = 80 Vdc, I_D = 6.0 Adc, V_{GS} = 5.0 Vdc)	Q_{tot}	−	11.3	20	nC
Gate−to−Source Charge		Q_{gs}	−	1.9	−	
Gate−to−Drain Charge		Q_{gd}	−	7.4	−	
BODY−DRAIN DIODE RATINGS (Note 4)						
Diode Forward On−Voltage	(I_S = 12 Adc, V_{GS} = 0 Vdc) (I_S = 12 Adc, V_{GS} = 0 Vdc, T_J = 125°C)	V_{SD}	− −	0.90 0.80	1.4 −	Vdc
Reverse Recovery Time	(I_S = 12 Adc, V_{GS} = 0 Vdc, dI_S/dt = 100 A/μs)	t_{rr}	−	80	−	ns
		t_a	−	50	−	
		t_b	−	30	−	
Reverse Recovery Stored Charge		Q_{RR}	−	0.240	−	μC

4. Indicates Pulse Test: P.W. = 300 μs max, Duty Cycle = 2%.
5. Switching characteristics are independent of operating junction temperature.

ORDERING INFORMATION

Device	Package	Shipping†
NTD6600N	DPAK	75 Units/Rail
NTD6600N−1	DPAK−3	
NTD6600N−1G	DPAK−3 (Pb−Free)	
NTD6600NT4	DPAK	2500 Tape & Reel
NTD6600NT4G	DPAK (Pb−Free)	

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

TYPICAL CHARACTERISTICS

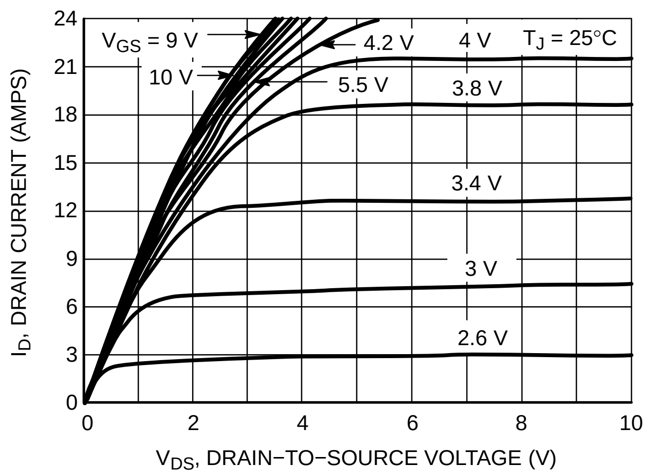


Figure 1. On−Region Characteristics

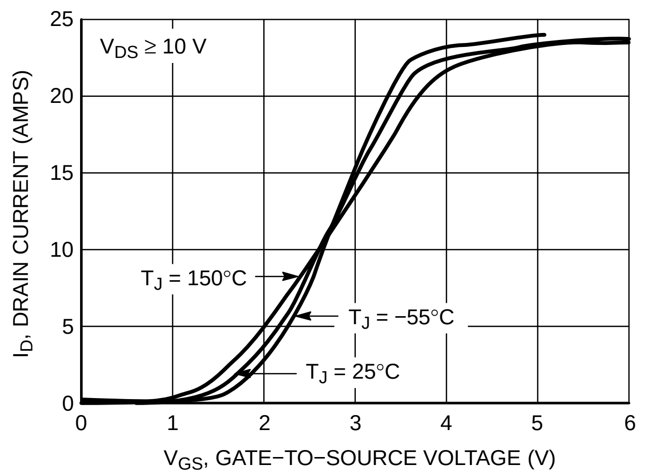


Figure 2. Transfer Characteristics

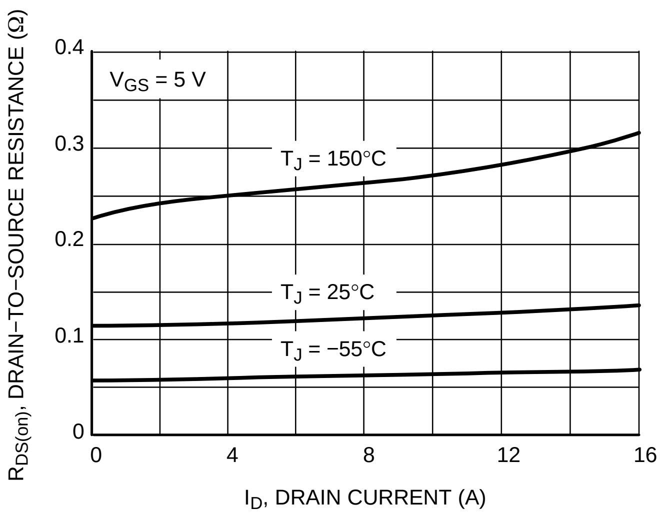


Figure 3. On−Resistance versus Drain Current and Temperature

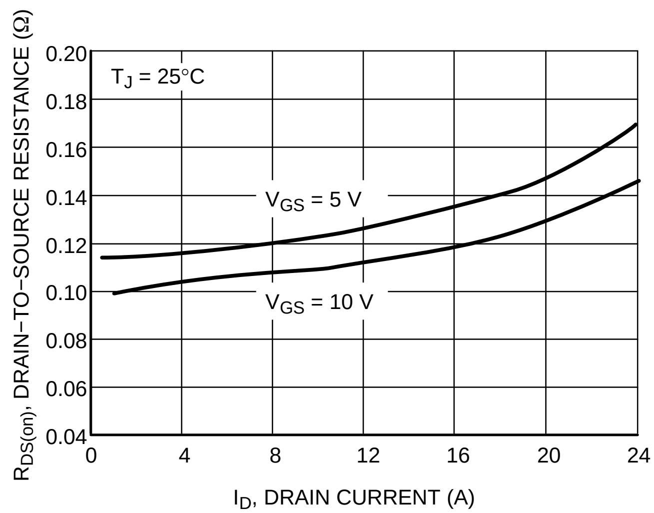


Figure 4. On−Resistance versus Drain Current and Temperature

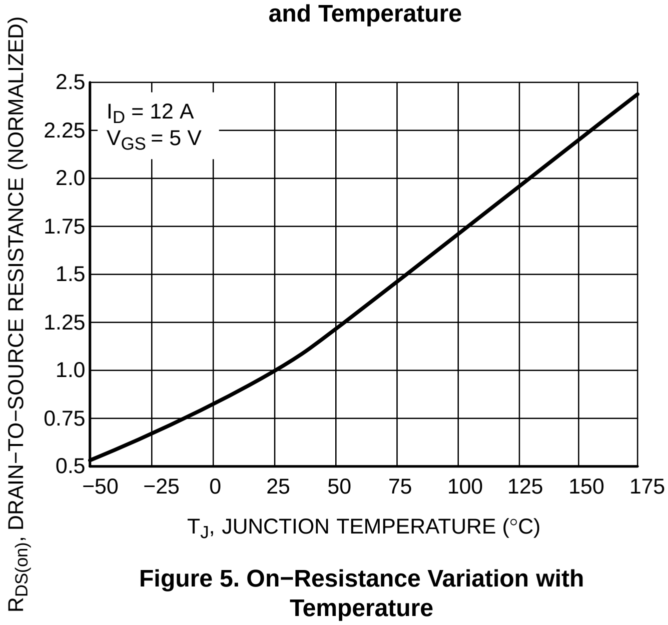


Figure 5. On−Resistance Variation with Temperature

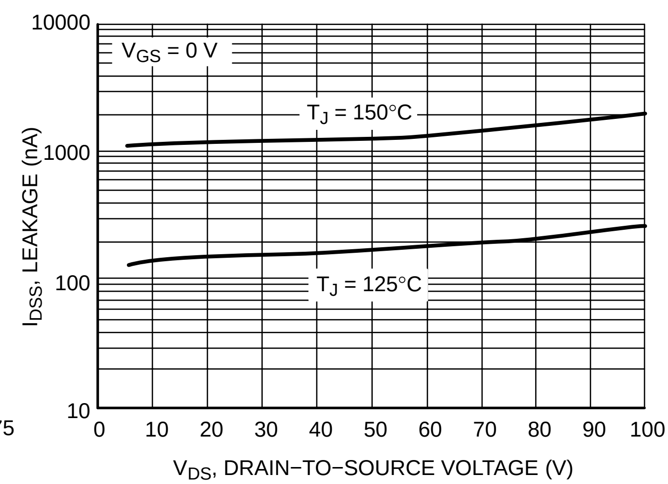


Figure 6. Drain−To−Source Leakage Current versus Voltage

TYPICAL CHARACTERISTICS

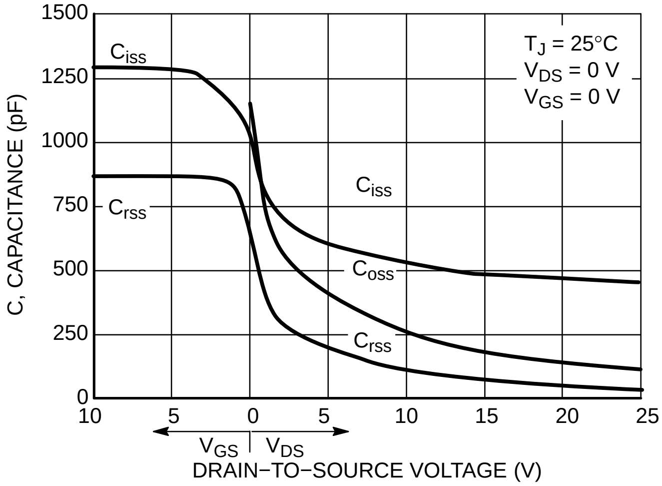


Figure 7. Capacitance Variation

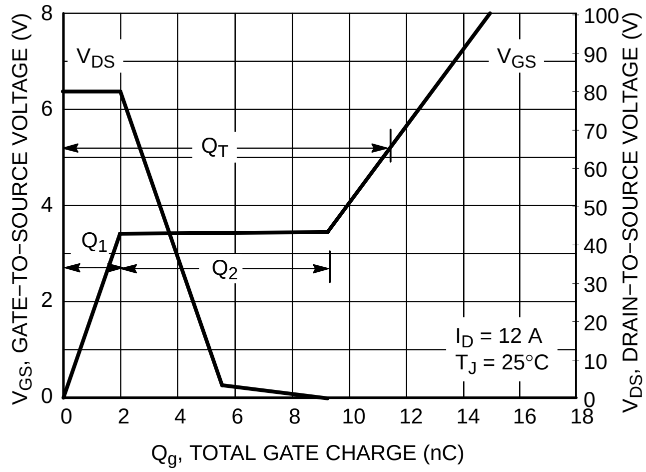


Figure 8. Gate−to−Source and Drain−to−Source Voltage versus Total Charge

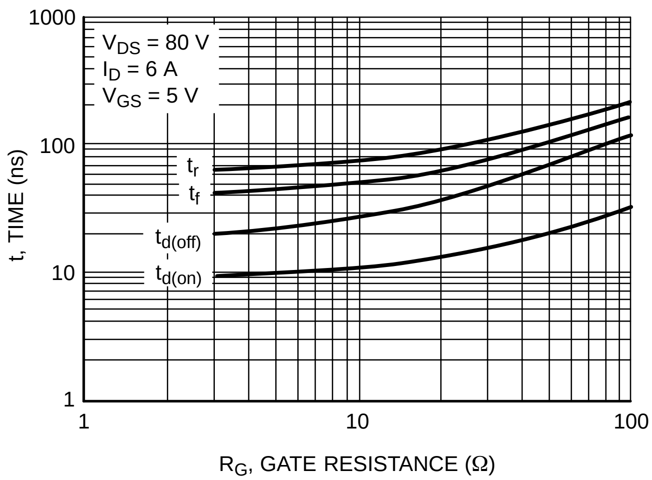


Figure 9. Resistive Switching Time Variation versus Gate Resistance

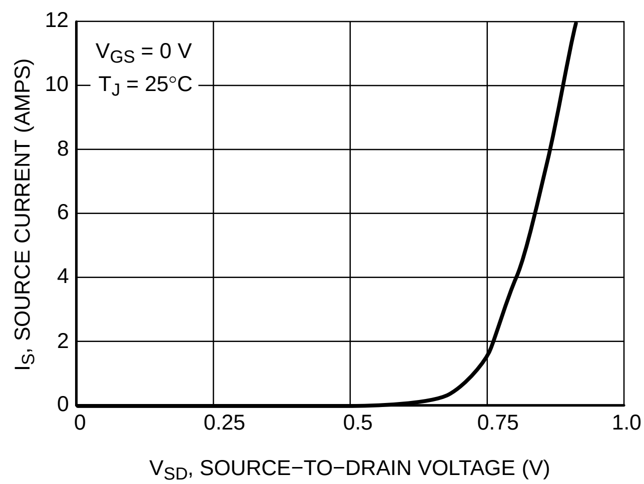


Figure 10. Diode Forward Voltage versus Current

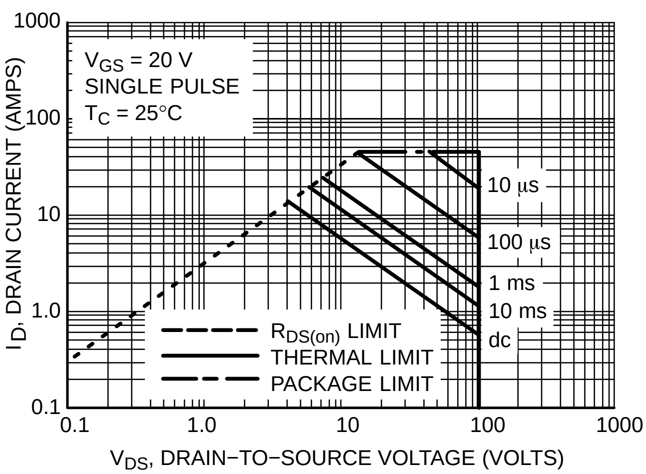


Figure 11. Maximum Rated Forward Biased Safe Operating Area

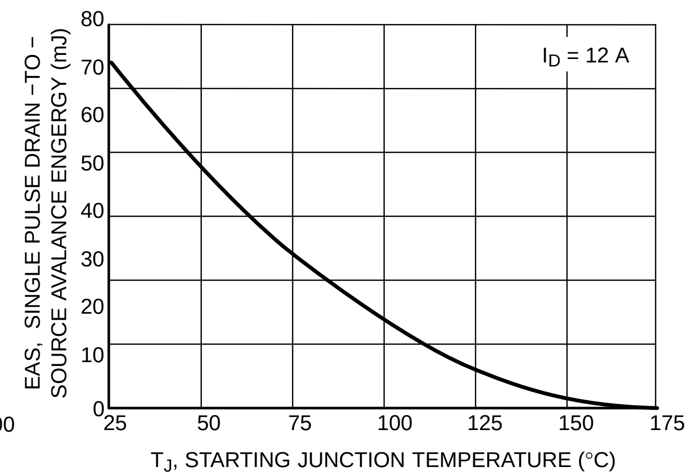
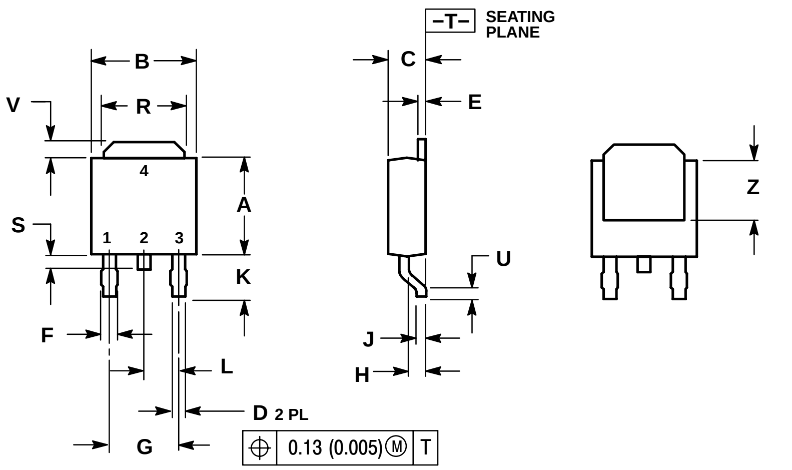


Figure 12. Maximum Avalanche Energy versus Starting Junction Temperature

PACKAGE DIMENSIONS

DPAK
CASE 369C−01
ISSUE O

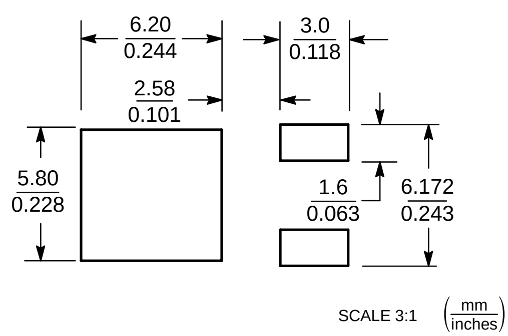


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
A	0.235	0.245	5.97	6.22
B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.180 BSC		4.58 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.102	0.114	2.60	2.89
L	0.090 BSC		2.29 BSC	
R	0.180	0.215	4.57	5.45
S	0.025	0.040	0.63	1.01
U	0.020	−−−	0.51	−−−
V	0.035	0.050	0.89	1.27
Z	0.155	−−−	3.93	−−−

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

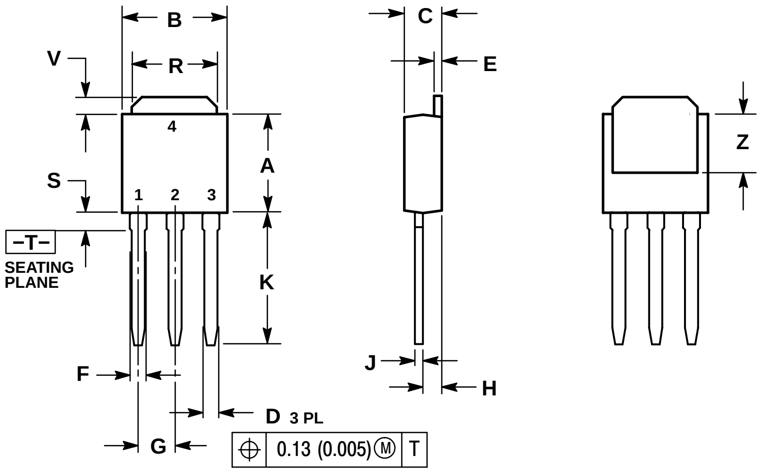
SOLDERING FOOTPRINT*



*For additional information on our Pb−Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

PACKAGE DIMENSIONS

DPAK−3
CASE 369D−01
ISSUE B



NOTES:
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2. CONTROLLING DIMENSION: INCH.

DIM	INCHES MIN	INCHES MAX	MILLIMETERS MIN	MILLIMETERS MAX
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B	0.250	0.265	6.35	6.73
C	0.086	0.094	2.19	2.38
D	0.027	0.035	0.69	0.88
E	0.018	0.023	0.46	0.58
F	0.037	0.045	0.94	1.14
G	0.090 BSC		2.29 BSC	
H	0.034	0.040	0.87	1.01
J	0.018	0.023	0.46	0.58
K	0.350	0.380	8.89	9.65
R	0.180	0.215	4.45	5.45
S	0.025	0.040	0.63	1.01
V	0.035	0.050	0.89	1.27
Z	0.155	−−−	3.93	−−−

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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
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Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
Email: orderlit@onsemi.com

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