

NTD5805N

Power MOSFET

40 V, 51 A, Single N-Channel, DPAK/IPAK

Features

- Low $R_{DS(on)}$
- High Current Capability
- Avalanche Energy Specified
- These are Pb-Free Devices

Applications

- LED Backlight Driver
- CCFL Backlight
- DC Motor Control
- Power Supply Secondary Side Synchronous Rectification

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

Parameter	Symbol	Value	Unit	
Drain-to-Source Voltage	V_{DSS}	40	V	
Gate-to-Source Voltage – Continuous	V_{GS}	± 20	V	
Gate-to-Source Voltage – Non-Repetitive ($t_p < 10 \mu\text{s}$)	V_{GS}	± 30	V	
Continuous Drain Current ($R_{\theta JC}$) (Note 1)	Steady State	$T_C = 25^\circ\text{C}$	I_D 51	A
		$T_C = 100^\circ\text{C}$	36	
Power Dissipation ($R_{\theta JC}$) (Note 1)		$T_C = 25^\circ\text{C}$	P_D 47	W
Pulsed Drain Current	$t_p = 10 \mu\text{s}$	I_{DM}	85	A
Operating Junction and Storage Temperature	T_J, T_{stg}	-55 to 175		$^\circ\text{C}$
Source Current (Body Diode)	I_S	30		A
Single Pulse Drain-to-Source Avalanche Energy ($V_{DD} = 50 \text{ V}, V_{GS} = 10 \text{ V}, R_G = 25 \Omega, I_{L(pk)} = 40 \text{ A}, L = 0.1 \text{ mH}, V_{DS} = 40 \text{ V}$)	E_{AS}	80		mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260		$^\circ\text{C}$

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.

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{\theta JC}$	3.2	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	107	

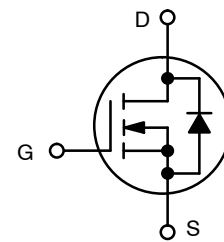
1. Surface-mounted on FR4 board using the minimum recommended pad size.



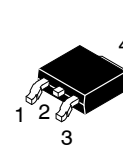
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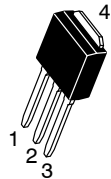
$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX
40 V	16 m Ω @ 5.0 V	51 A
	9.5 m Ω @ 10 V	



N-CHANNEL MOSFET

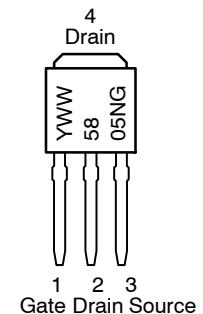
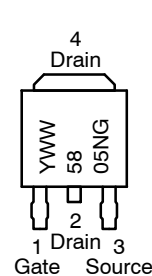


CASE 369C
DPAK
(Surface Mount)
STYLE 2



CASE 369D
IPAK
(Straight Lead
DPAK)

MARKING DIAGRAMS & PIN ASSIGNMENT



Y = Year
WW = Work Week
5805N = Device Code
G = Pb-Free Package

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

NTD5805N

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = 250 μA	40			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J			40.8		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = 40 V	T _J = 25°C		1.0	μA
			T _J = 150°C		100	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±20 V			±100	nA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = 250 μA	1.5		3.5	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J			7.04		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 15 A		7.6	9.5	mΩ
		V _{GS} = 5.0 V, I _D = 10 A		10.9	16	
Forward Transconductance	g _{FS}	V _{DS} = 15 V, I _D = 15 A		8.54		S

CHARGES, CAPACITANCES AND GATE RESISTANCES

Input Capacitance	C _{iss}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = 25 V		1725		pF
Output Capacitance	C _{oss}			220		
Reverse Transfer Capacitance	C _{rss}			160		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = 10 V, V _{DS} = 32 V, I _D = 30 A		33	80	nC
Threshold Gate Charge	Q _{G(TH)}			2.0		
Gate-to-Source Charge	Q _{GS}			7.2		
Gate-to-Drain Charge	Q _{GD}			9.8		

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t _{d(on)}	V _{GS} = 10 V, V _{DD} = 32 V, I _D = 30 A, R _G = 2.5 Ω		10.2		ns
Rise Time	t _r			17.9		
Turn-Off Delay Time	t _{d(off)}			22.9		
Fall Time	t _f			4.5		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = 10 A	T _J = 25°C		0.83	1.2	V
			T _J = 150°C		0.65		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _S /dt = 100 A/μs, I _S = 30 A		24.8		ns	
Charge Time	t _a			14.6			
Discharge Time	t _b			10.2			
Reverse Recovery Charge	Q _{RR}			15.5			nC

- Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
- Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CHARACTERISTICS

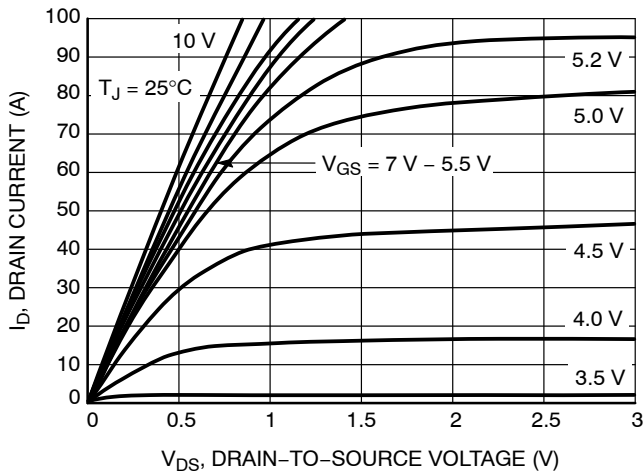


Figure 1. On-Region Characteristics

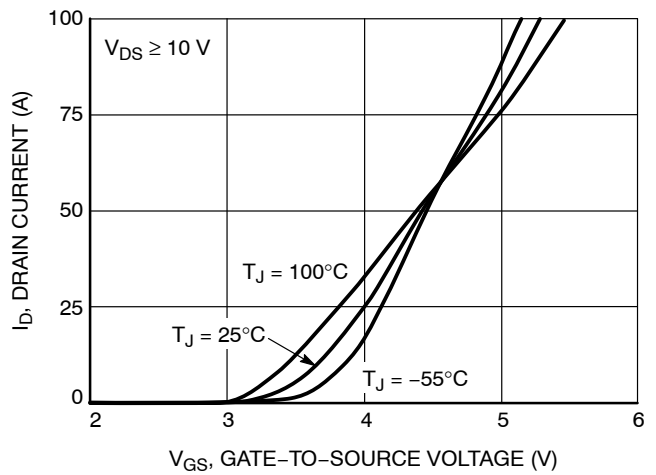


Figure 2. Transfer Characteristics

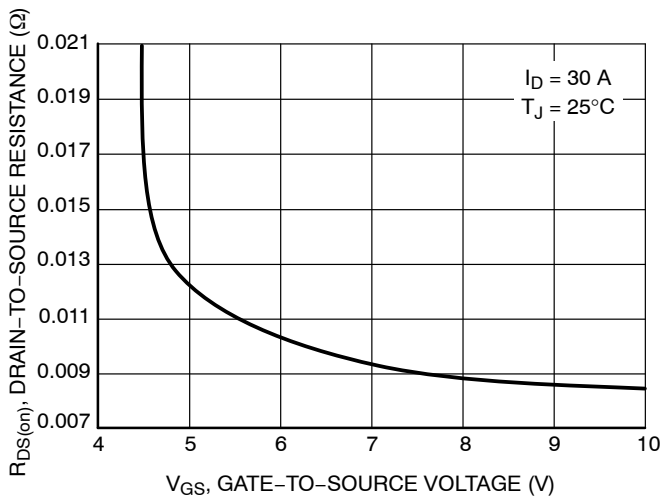


Figure 3. On-Resistance vs. Drain Current

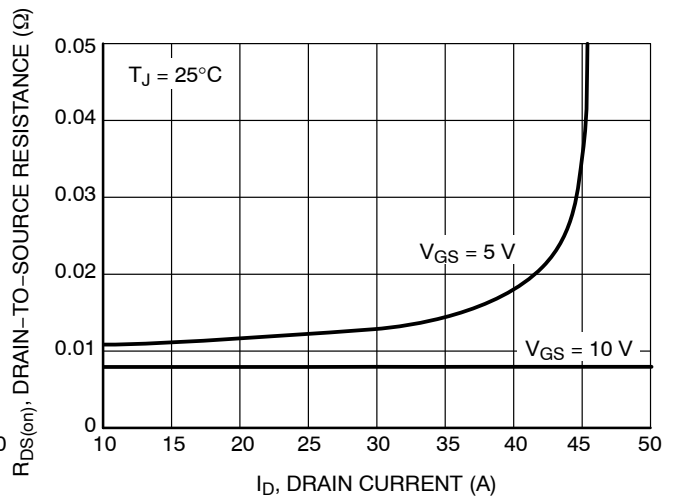


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

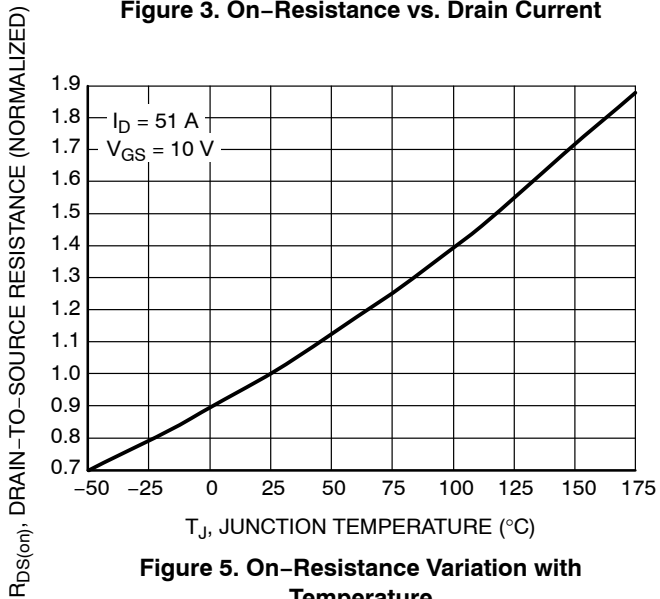


Figure 5. On-Resistance Variation with Temperature

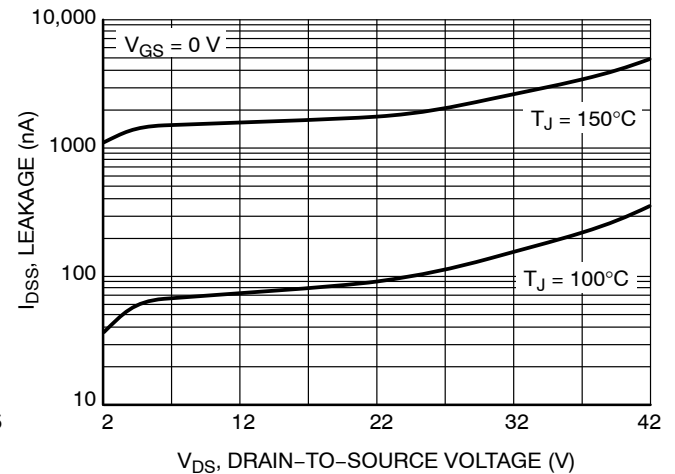
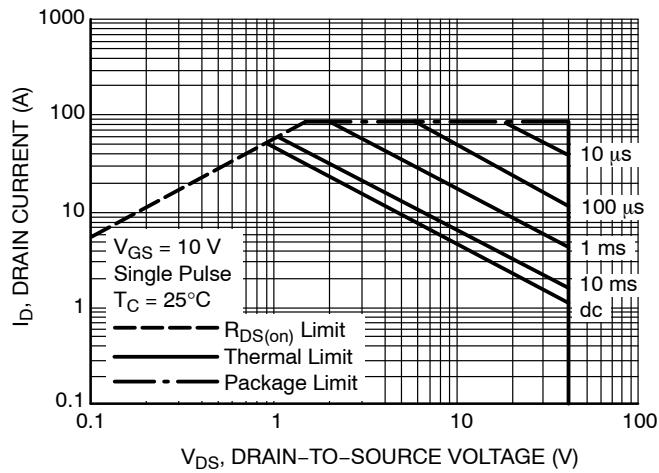
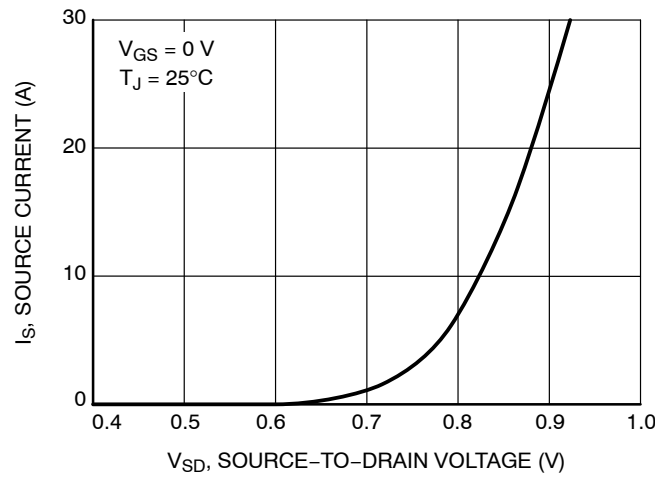
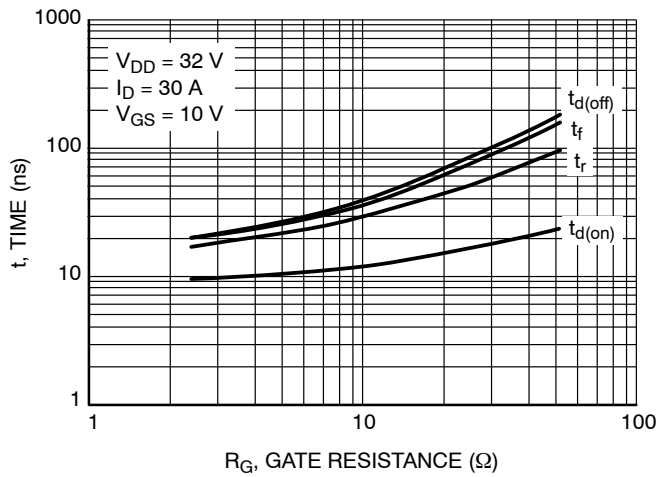
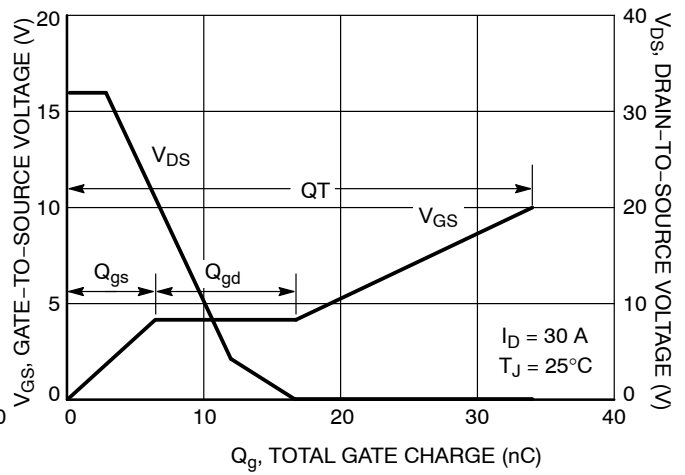
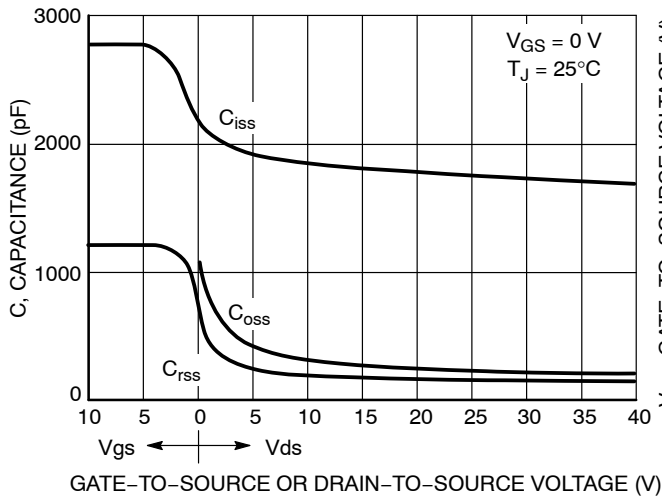


Figure 6. Drain-to-Source Leakage Current vs. Voltage

NTD5805N

TYPICAL PERFORMANCE CHARACTERISTICS



NTD5805N

TYPICAL PERFORMANCE CHARACTERISTICS

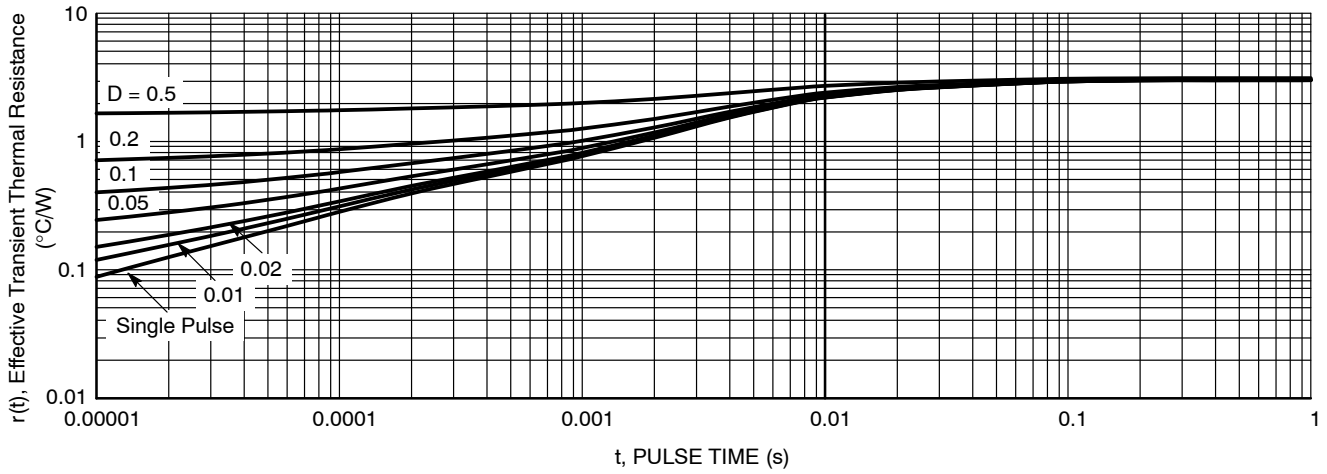


Figure 12. Thermal Response

ORDERING INFORMATION

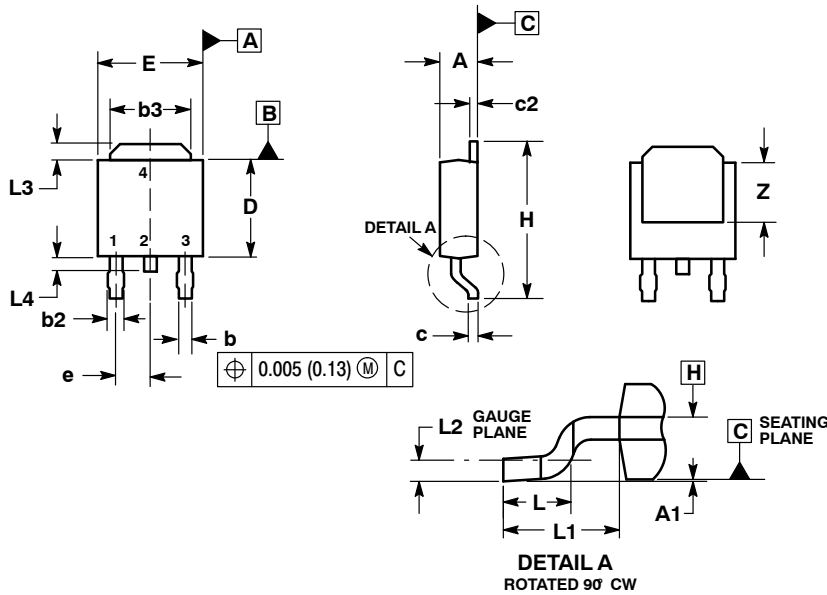
Order Number	Package	Shipping [†]
NTD5805NG	IPAK (Straight Lead DPAK) (Pb-Free)	75 Units / Rail
NTD5805NT4G	DPAK (Pb-Free)	2500 / Tape & Reel

[†]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.

NTD5805N

PACKAGE DIMENSIONS

DPAK
CASE 369C-01
ISSUE D

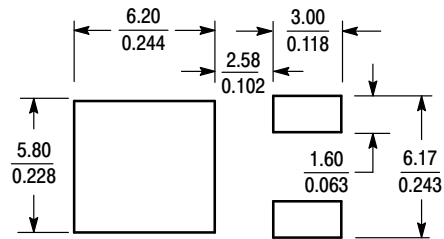


NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSIONS b3, L3 and Z.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.006 INCHES PER SIDE.
5. DIMENSIONS D AND E ARE DETERMINED AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY.
6. DATUMS A AND B ARE DETERMINED AT DATUM PLANE H.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.086	0.094	2.18	2.38
A1	0.000	0.005	0.00	0.13
b	0.025	0.035	0.63	0.89
b2	0.030	0.045	0.76	1.14
b3	0.180	0.215	4.57	5.46
c	0.018	0.024	0.46	0.61
c2	0.018	0.024	0.46	0.61
D	0.235	0.245	5.97	6.22
E	0.250	0.265	6.35	6.73
e	0.090 BSC		2.29 BSC	
H	0.370	0.410	9.40	10.41
L	0.055	0.070	1.40	1.78
L1	0.108 REF		2.74 REF	
L2	0.020 BSC		0.51 BSC	
L3	0.035	0.050	0.89	1.27
L4	---	0.040	---	1.01
Z	0.155	---	3.93	---

SOLDERING FOOTPRINT*



SCALE 3:1 $\left(\frac{\text{mm}}{\text{inches}}\right)$

STYLE 2:

- PIN 1. GATE
- DRAIN
- SOURCE
- DRAIN

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

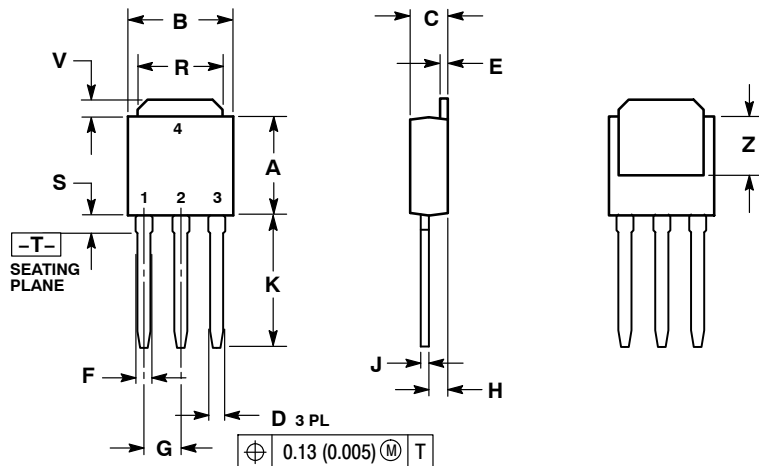
NTD5805N

PACKAGE DIMENSIONS

IPAK (STRAIGHT LEAD DPAK)

CASE 369D-01

ISSUE B



NOTES:

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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.235	0.245	5.97	6.35
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

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