

# EVVOSEMI<sup>®</sup>

THINK CHANGE DO



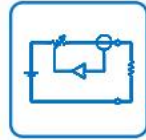
ESD



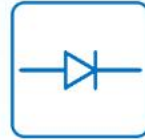
TVS



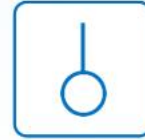
MOS



LDO



Diode



Sensor



DC-DC

## Product Specification

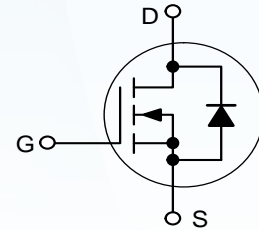
▶ Domestic	Part Number	NTD4804NT4G
▶ Overseas	Part Number	NTD4804NT4G
▶ Equivalent	Part Number	NTD4804NT4G

EV is the abbreviation of name EVVO

## 30V N-Channel MOSFET

### Description

- Low  $R_{DS(on)}$  to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses
- These Devices are Pb-Free and are RoHS Compliant
- CPU Power Delivery
- DC-DC Converters
- Low Side Switching



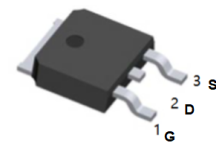
### Features

$V_{DS}$  (V) = 30V

$I_D$  = 117A ( $V_{GS}$  = 10V)

$R_{DS(ON)}$  < 4m $\Omega$  ( $V_{GS}$  = 10V)

$R_{DS(ON)}$  < 5.5m $\Omega$  ( $V_{GS}$  = 4.5V)



TO-252(DPAK) top view

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

Parameter		Symbol	Value	Unit	
Drain-to-Source Voltage		$V_{DSS}$	30	V	
Gate-to-Source Voltage		$V_{GS}$	$\pm 20$	V	
Continuous Drain Current ( $R_{\theta JA}$ ) (Note 1)		$T_A = 25^\circ\text{C}$	$I_D$	19.6	A
		$T_A = 85^\circ\text{C}$		15.2	
Power Dissipation ( $R_{\theta JA}$ ) (Note 1)		$T_A = 25^\circ\text{C}$	$P_D$	2.66	W
Continuous Drain Current ( $R_{\theta JA}$ ) (Note 2)		$T_A = 25^\circ\text{C}$	$I_D$	14.5	A
		$T_A = 85^\circ\text{C}$		11	
Power Dissipation ( $R_{\theta JA}$ ) (Note 2)		$T_A = 25^\circ\text{C}$	$P_D$	1.43	W
Continuous Drain Current ( $R_{\theta JC}$ ) (Note 1)		$T_C = 25^\circ\text{C}$	$I_D$	124	A
		$T_C = 85^\circ\text{C}$		96	
Power Dissipation ( $R_{\theta JC}$ ) (Note 1)		$T_C = 25^\circ\text{C}$	$P_D$	107	W
Pulsed Drain Current	$t_p = 10\mu\text{s}$	$T_A = 25^\circ\text{C}$	$I_{DM}$	230	A
Current Limited by Package		$T_A = 25^\circ\text{C}$	$I_{DmaxPkg}$	45	A
Operating Junction and Storage Temperature		$T_J, T_{stg}$	-55 to 175	$^\circ\text{C}$	
Source Current (Body Diode)		$I_S$	78	A	
Drain to Source $dV/dt$		$dV/dt$	6.0	V/ns	
Single Pulse Drain-to-Source Avalanche Energy ( $V_{DD} = 24\text{ V}, V_{GS} = 10\text{ V}, L = 1.0\text{ mH}, I_{L(pk)} = 30\text{ A}, R_G = 25\ \Omega$ )		$E_{AS}$	450	mJ	
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		$T_L$	260	$^\circ\text{C}$	

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

## 30V N-Channel MOSFET

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{\theta JC}$	1.4	°C/W
Junction-to-TAB (Drain)	$R_{\theta JC-TAB}$	3.5	
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	56.4	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	105	

1. Surface-mounted on FR4 board using 1 in sq pad size, 1 oz Cu.
2. Surface-mounted on FR4 board using the minimum recommended pad size.

### ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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#### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			26		mV/°C
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V}, V_{DS} = 24\text{ V}$	$T_J = 25^\circ\text{C}$		1.0	$\mu\text{A}$
			$T_J = 125^\circ\text{C}$		10	
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 100$	nA

#### ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	1.5		2.5	V	
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			7.6		mV/°C	
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ to }11.5\text{ V}$	$I_D = 30\text{ A}$		3.4	4.0	mΩ
			$I_D = 15\text{ A}$		3.4		
		$V_{GS} = 4.5\text{ V}$	$I_D = 30\text{ A}$		4.7	5.5	
			$I_D = 15\text{ A}$		4.6		
Forward Transconductance	$g_{FS}$	$V_{DS} = 15\text{ V}, I_D = 15\text{ A}$		23		S	

#### CHARGES AND CAPACITANCES

Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 12\text{ V}$		4490		pF
Output Capacitance	$C_{oss}$			952		
Reverse Transfer Capacitance	$C_{rss}$			556		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 30\text{ A}$		30	40	nC
Threshold Gate Charge	$Q_{G(TH)}$			5.5		
Gate-to-Source Charge	$Q_{GS}$			13		
Gate-to-Drain Charge	$Q_{GD}$			13		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 11.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 30\text{ A}$		73		nC

#### SWITCHING CHARACTERISTICS (Note 4)

Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 15\text{ A}, R_G = 3.0\ \Omega$		18		ns
Rise Time	$t_r$			20		
Turn-Off Delay Time	$t_{d(off)}$			24		
Fall Time	$t_f$			8		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 11.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 15\text{ A}, R_G = 3.0\ \Omega$		10		ns
Rise Time	$t_r$			19		
Turn-Off Delay Time	$t_{d(off)}$			35		
Fall Time	$t_f$			5		

3. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
4. Switching characteristics are independent of operating junction temperatures.

### 30V N-Channel MOSFET

**ELECTRICAL CHARACTERISTICS** ( $T_J = 25\text{ C}$  unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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**DRAIN-SOURCE DIODE CHARACTERISTICS**

Forward Diode Voltage	$V_{SD}$	$V_{GS} = 0\text{ V},$ $I_S = 30\text{ A}$	$T_J = 25^\circ\text{C}$		0.81	1.2	V
			$T_J = 125^\circ\text{C}$		0.72		
Reverse Recovery Time	$t_{RR}$	$V_{GS} = 0\text{ V},$ $dI_S/dt = 100\text{ A}/\mu\text{s},$ $I_S = 30\text{ A}$			34		ns
Charge Time	$t_a$				19		
Discharge Time	$t_b$				15		
Reverse Recovery Time	$Q_{RR}$				30		

**PACKAGE PARASITIC VALUES**

Source Inductance	$L_S$	$T_A = 25^\circ\text{C}$		2.49		nH
Drain Inductance, DPAK	$L_D$			0.0164		
Drain Inductance, IPAK	$L_D$			1.88		
Gate Inductance	$L_G$			3.46		
Gate Resistance	$R_G$			0.6		

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

30V N-Channel MOSFET

TYPICAL PERFORMANCE CURVES

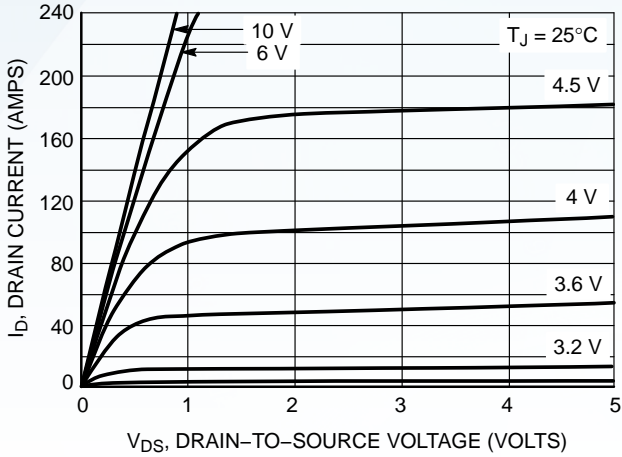


Figure 1. On-Region Characteristics

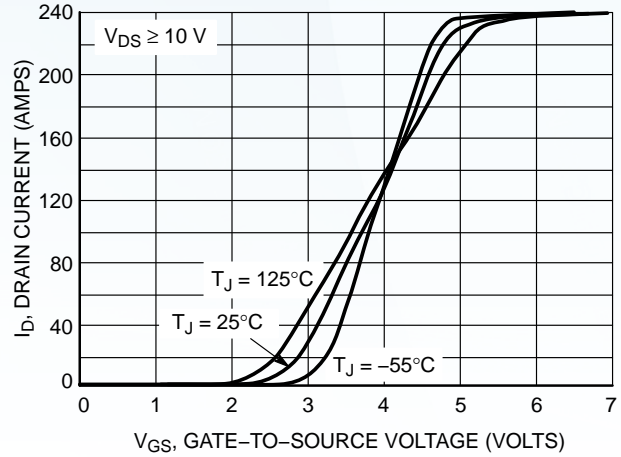


Figure 2. Transfer Characteristics

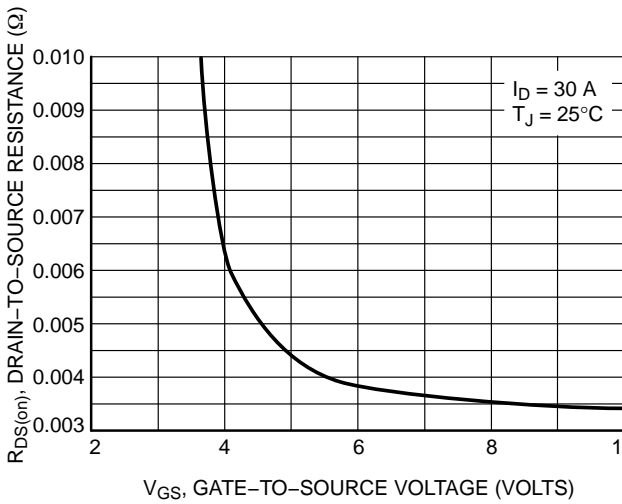


Figure 3. On-Resistance vs. Gate-to-Source Voltage

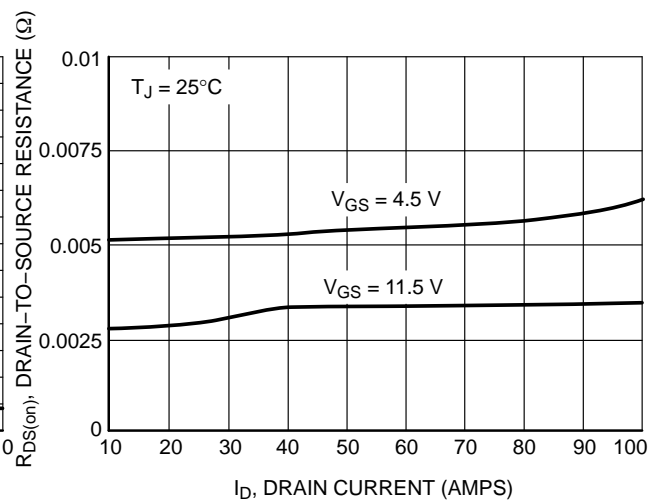


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

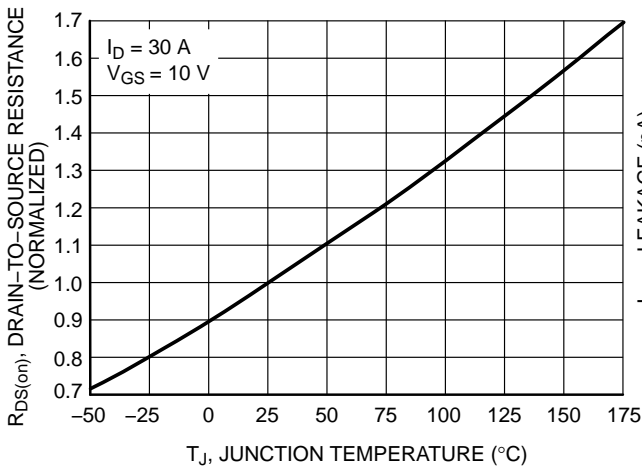


Figure 5. On-Resistance Variation with Temperature

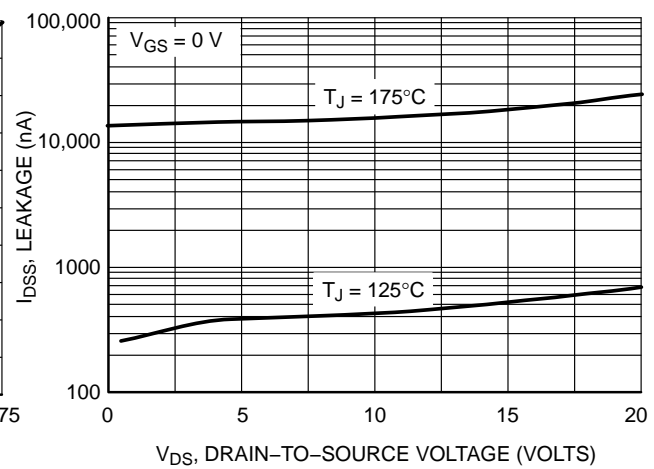


Figure 6. Drain-to-Source Leakage Current vs. Drain Voltage

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TYPICAL PERFORMANCE CURVES

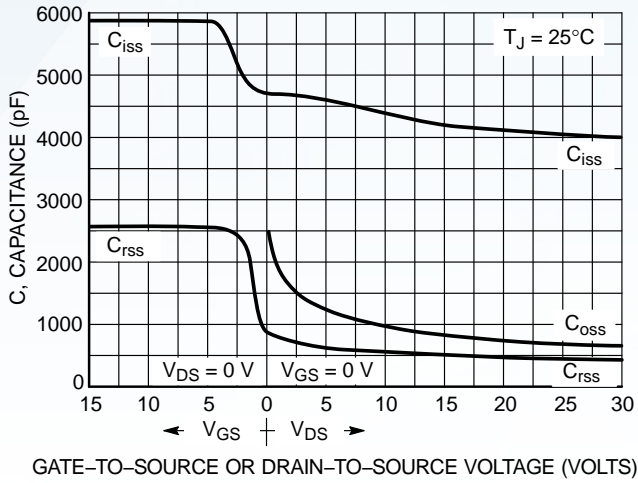


Figure 7. Capacitance Variation

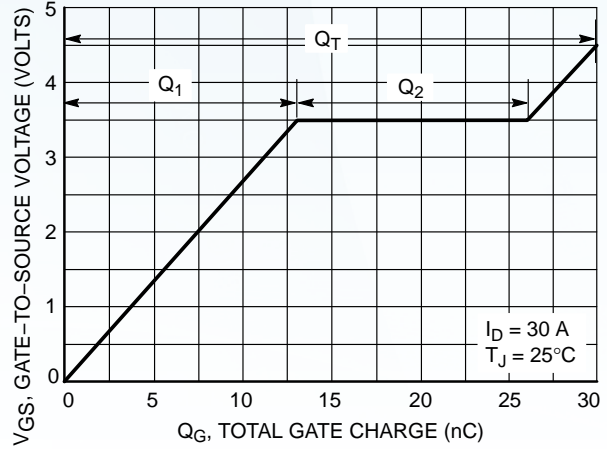


Figure 8. Gate-To-Source and Drain-To-Source Voltage vs. Total Charge

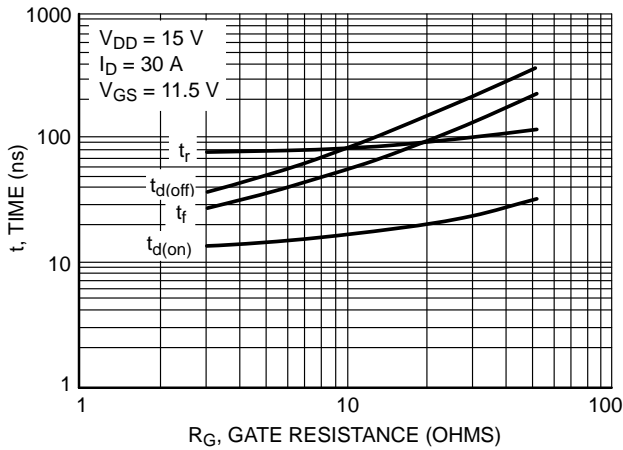


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

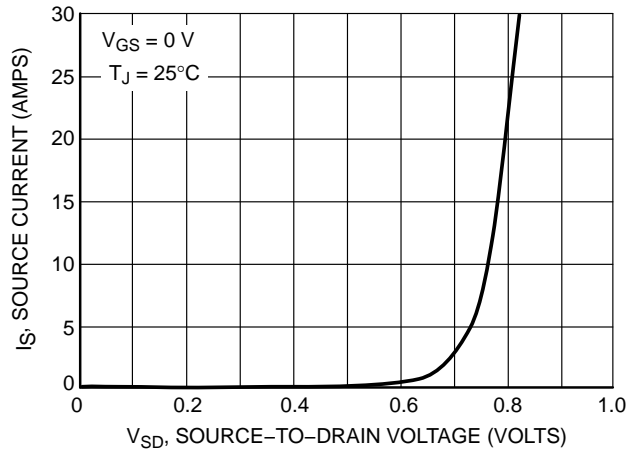


Figure 10. Diode Forward Voltage vs. Current

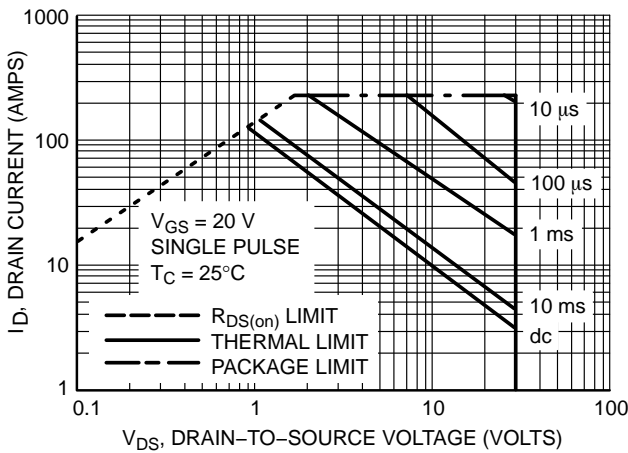


Figure 11. Maximum Rated Forward Biased Safe Operating Area

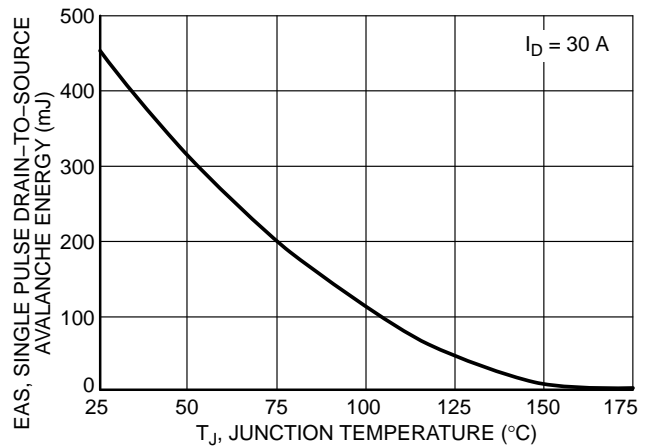


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature



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TYPICAL PERFORMANCE CURVES

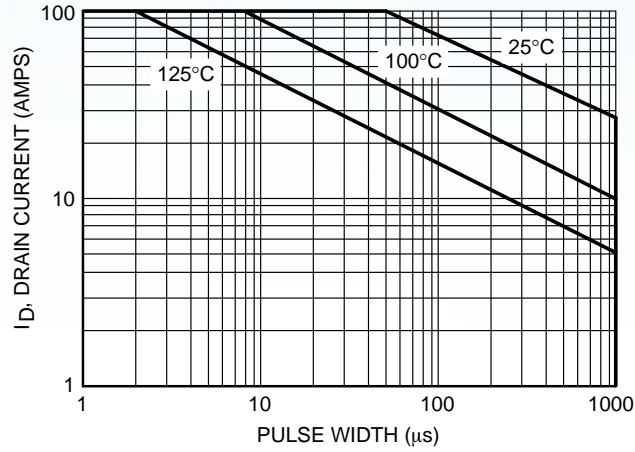


Figure 13. Avalanche Characteristics

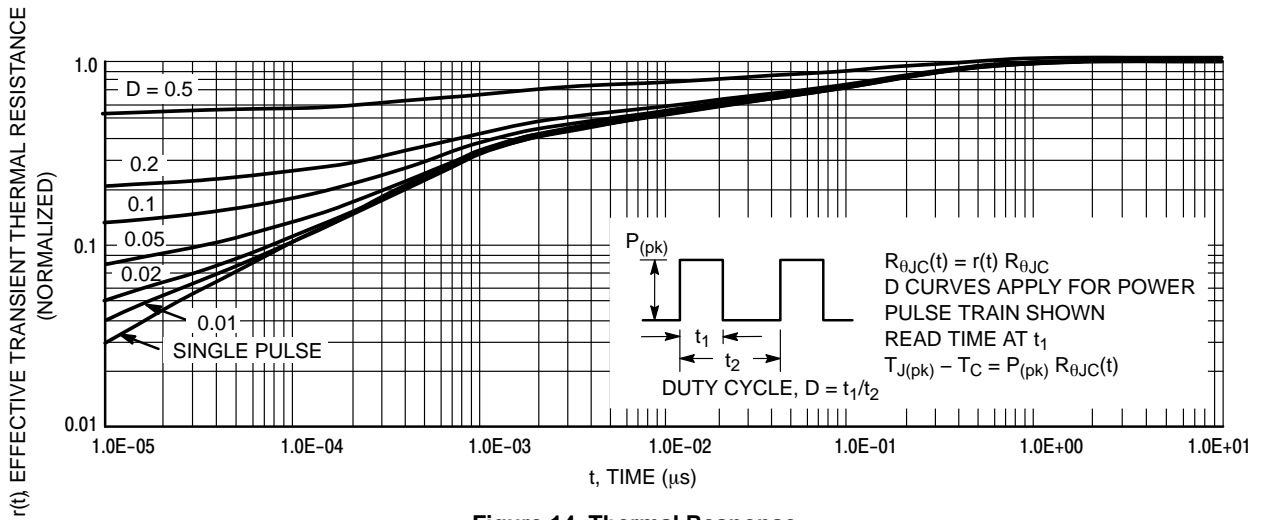
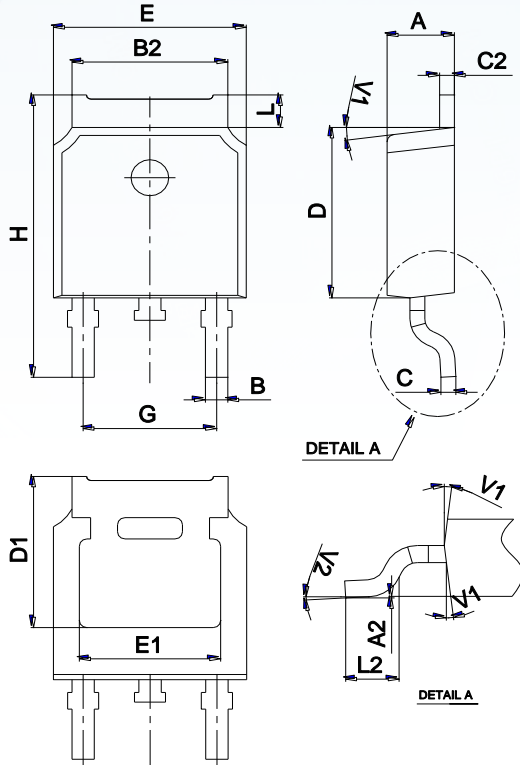


Figure 14. Thermal Response

**Package Mechanical Data TO-252**

**30V N-Channel MOSFET**



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

**Ordering information**

Order code	Package	Baseqty	Delivery mode
NTD4804NT4G	TO-252	2500	Tape and reel



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