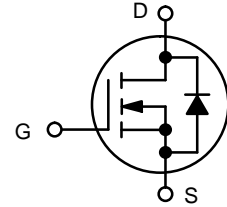


Features

- Low $R_{DS(on)}$
- High Current Capability
- $V_{DS}(V) = 60V$
- $I_D = 20A$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 39m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 50m\Omega$ ($V_{GS} = 4.5V$)



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

Parameter		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DSS}	60	V
Gate-to-Source Voltage – Continuous		V_{GS}	± 20	V
Gate-to-Source Voltage – Non-Repetitive ($t_p < 10 \mu s$)		V_{GS}	± 30	V
Continuous Drain Current ($R_{\theta JC}$)	Steady State	$T_C = 25^\circ C$	20	A
		$T_C = 100^\circ C$	13	
Power Dissipation ($R_{\theta JC}$)		$T_C = 25^\circ C$	P_D	36 W
Pulsed Drain Current	$t_p = 10 \mu s$	I_{DM}	76	A
Operating Junction and Storage Temperature		T_J, T_{stg}	-55 to 150	$^\circ C$
Source Current (Body Diode)		I_S	20	A
Single Pulse Drain-to-Source Avalanche Energy ($V_{DD} = 50 V, V_{GS} = 10 V, R_G = 25 \Omega, I_{L(pk)} = 19 A, L = 0.1 mH, T_J = 25^\circ C$)		E_{AS}	18	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ C$

THERMAL RESISTANCE MAXIMUM RATINGS

Parameter	Symbol	Value	Unit
Junction-to-Case (Drain)	$R_{\theta JC}$	3.5	$^\circ C/W$
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	45	

1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit	
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60			V	
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			60		mV/°C	
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 60\text{ V}$	$T_J = 25^\circ\text{C}$		1.0	μA	
			$T_J = 125^\circ\text{C}$		100		
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA	
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	1.5	1.8	2.5	V	
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			5.2		mV/°C	
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$		26	39	$\text{m}\Omega$	
		$V_{GS} = 4.5\text{ V}, I_D = 10\text{ A}$		33	50		
Forward Transconductance	g_{FS}	$V_{DS} = 15\text{ V}, I_D = 10\text{ A}$		8.0		S	
Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 25\text{ V}$		675		pF	
Output Capacitance	C_{oss}			68			
Reverse Transfer Capacitance	C_{rss}			47			
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 10\text{ V}, V_{DS} = 48\text{ V}, I_D = 20\text{ A}$		15		nC	
Threshold Gate Charge	$Q_{G(TH)}$			1.0			
Gate-to-Source Charge	Q_{GS}			2.2			
Gate-to-Drain Charge	Q_{GD}			4.3			
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 48\text{ V}, I_D = 20\text{ A}$		7.6		nC	
Gate Resistance	R_G			1.3		Ω	
Turn-On Delay Time	$t_{d(on)}$	$V_{GS} = 10\text{ V}, V_{DD} = 48\text{ V}, I_D = 20\text{ A}, R_G = 2.5\ \Omega$		6.5		ns	
Rise Time	t_r			12.6			
Turn-Off Delay Time	$t_{d(off)}$			18.2			
Fall Time	t_f			2.4			
Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 10\text{ A}$	$T_J = 25^\circ\text{C}$		0.87	1.2	V
			$T_J = 100^\circ\text{C}$		0.78		
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, di/dt = 100\text{ A}/\mu\text{s}, I_S = 20\text{ A}$		17		ns	
Charge Time	t_a			13			
Discharge Time	t_b			4.0			
Reverse Recovery Charge	Q_{RR}			12		nC	

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.

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

TYPICAL PERFORMANCE CURVES

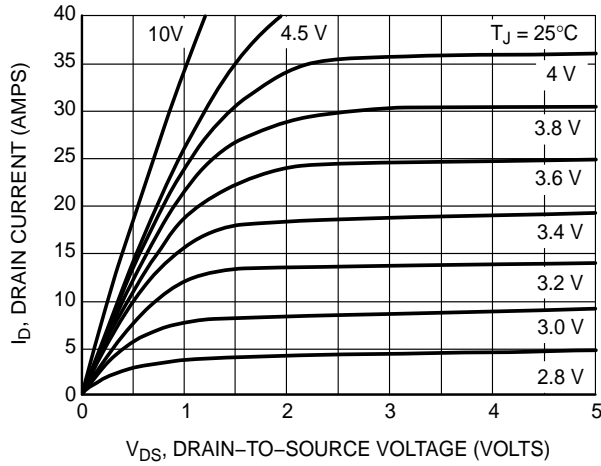


Figure 1. On-Region Characteristics

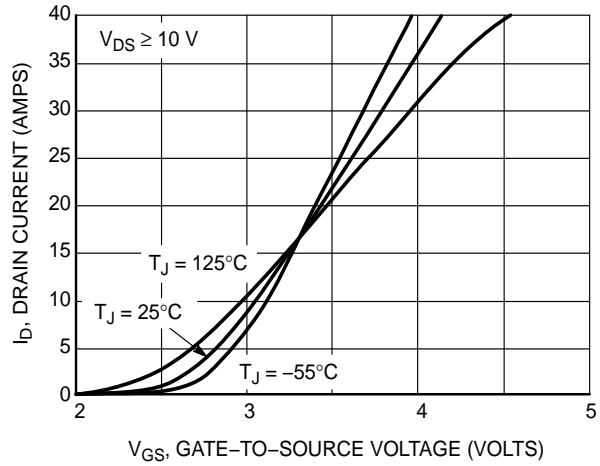


Figure 2. Transfer Characteristics

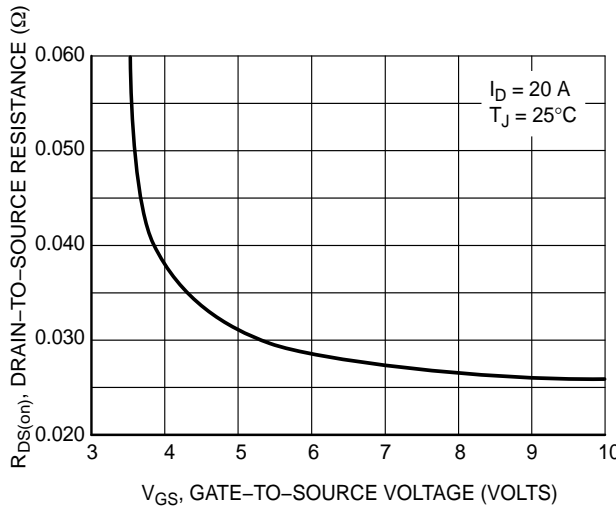


Figure 3. On-Resistance vs. Gate-to-Source Voltage

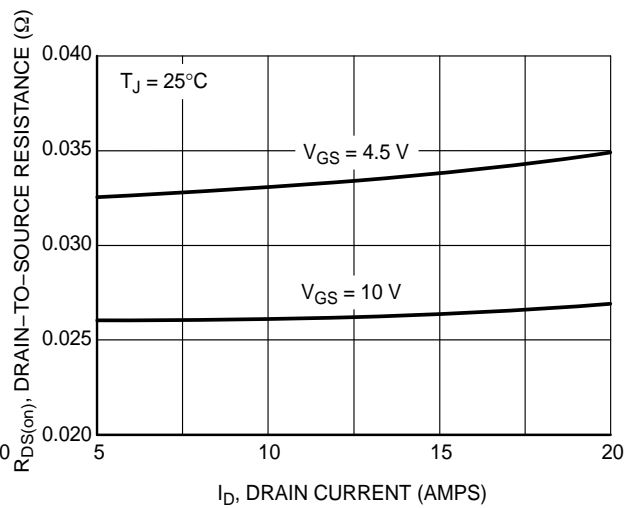


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

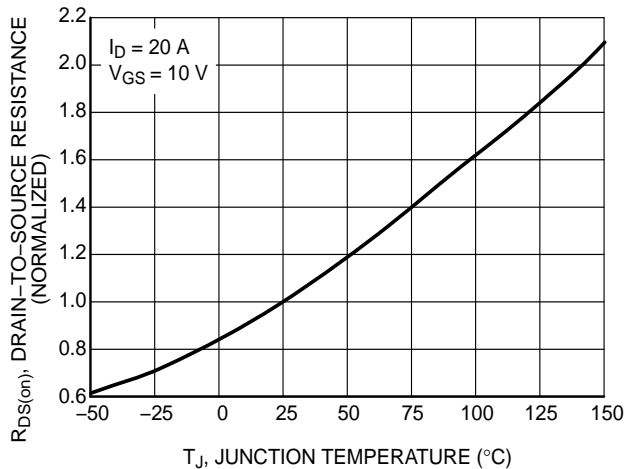


Figure 5. On-Resistance Variation with Temperature

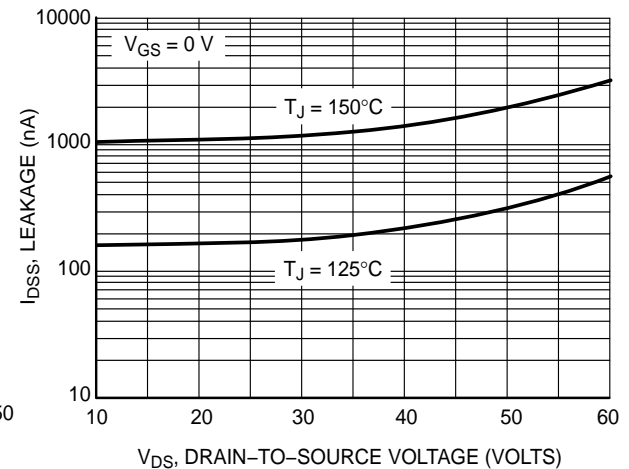


Figure 6. Drain-to-Source Leakage Current vs. Drain Voltage

TYPICAL PERFORMANCE CURVES

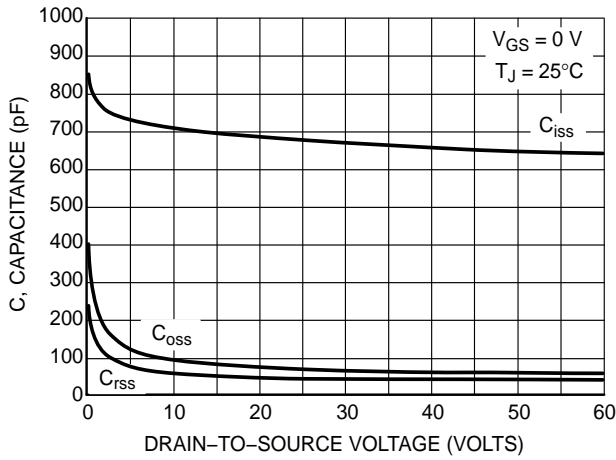


Figure 7. Capacitance Variation

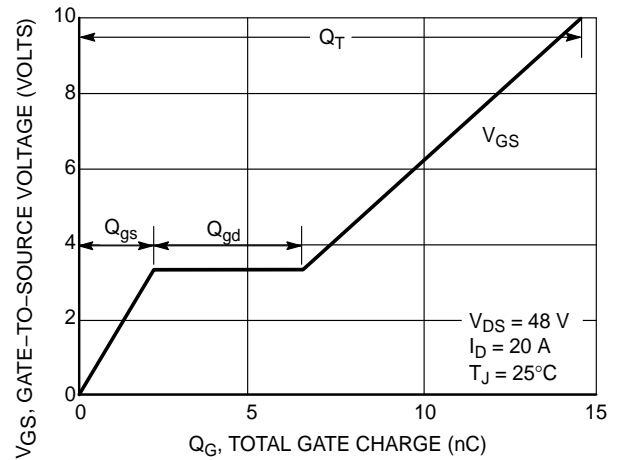


Figure 8. Gate-To-Source Voltage vs. Total Charge

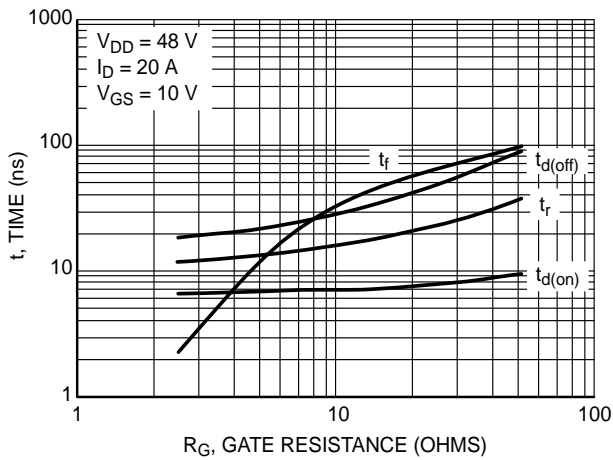


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

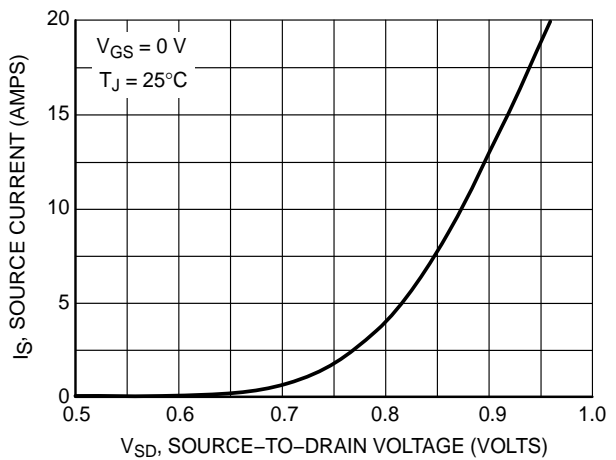


Figure 10. Diode Forward Voltage vs. Current

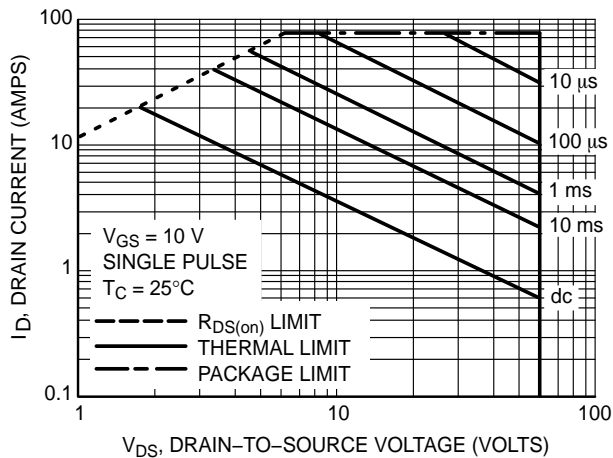


Figure 11. Maximum Rated Forward Biased Safe Operating Area

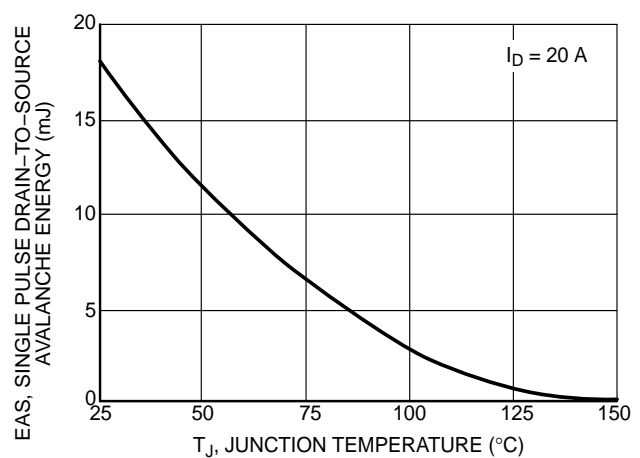


Figure 12. Maximum Avalanche Energy vs. Starting Junction Temperature

TYPICAL PERFORMANCE CURVES

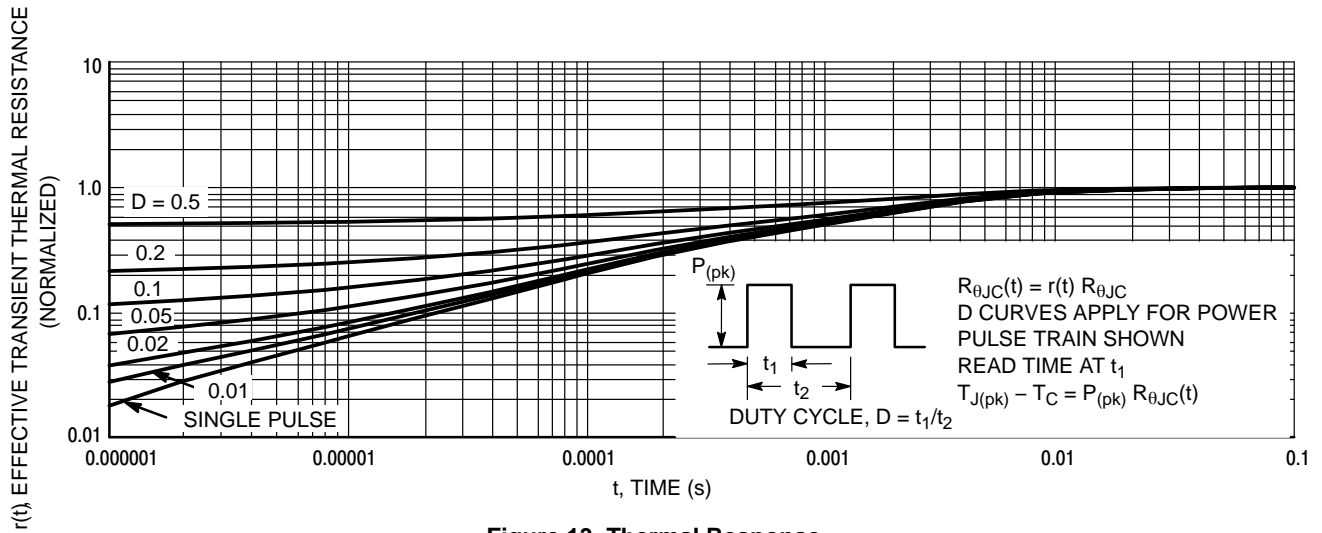
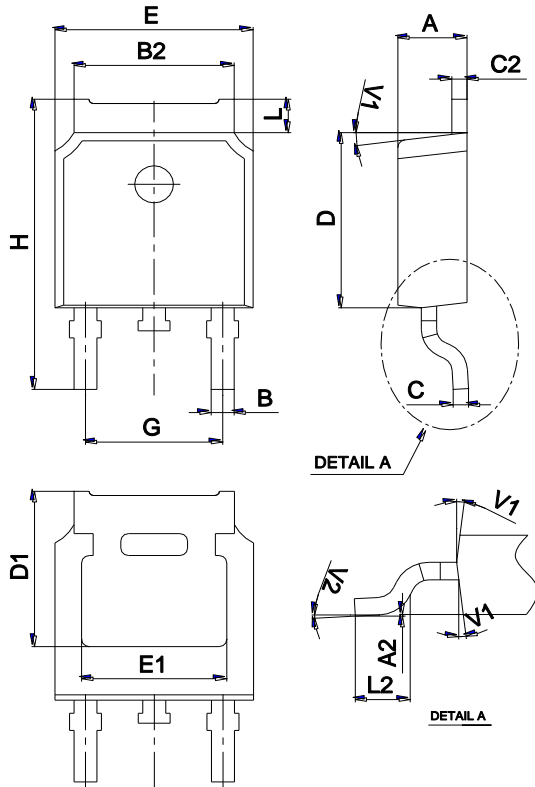


Figure 13. Thermal Response

Package Mechanical Data TO-252



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°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW NTD5867NLT4G	TO-252	2500	Tape and reel

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[MCQ7328-TP](#) [SSM3J143TU,LXHF](#) [DMN12M3UCA6-7](#) [PJMF280N65E1_T0_00201](#) [PJMF380N65E1_T0_00201](#)
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