UMW NTD5867NLT4G

60V N-Channel MOSFET

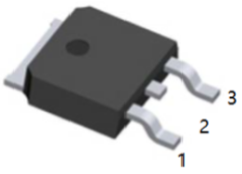
1.Features

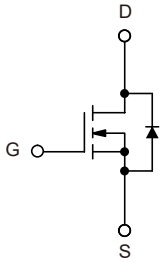
- $V_{DS\ (V)}$=60V
- I_D=20A
- $R_{DS(ON)}$<39mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<50mΩ(V_{GS}=4.5V)
- Low $R_{DS(ON)}$
- High Current Capability

2.Pinning information

Pin	Symbol	Description
1	G	GATE
2	D	DRAIN
3	S	SOURCE

TO-252(DPAK)
top view





3.Absolute Maximum Ratings T_J= 25°C

Parameter			Symbol	Value	Units
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<10μs)			V_{GS}	±30	V
Continuous Drain Current ($R_{\theta JC}$)	Steady State	T_C=25°C	I_D	20	A
		T_C=100°C		13	A
Power Dissipation ($R_{\theta JC}$)		T_C=25°C	P_D	36	W
Pulsed Drain Current	t_p=10μs		I_{DM}	76	A
Operating Junction and Storage Temperature			T_J,T_{STG}	-55 to 150	°C
Source Current (Body Diode)			I_S	20	A
Single Pulse Drain−to−Source Avalanche Energy (V_{DD}=50V, V_{GS}=10V, R_G=25 Ω,$I_{L(pk)}$=19 A, L=0.1mH, T_J=25°C)			E_{AS}	18	mJ
Lead Temperature for Soldering Purposes (1/8” from case for 10 s)			T_L	260	°C

4.Thermal Resistance Rating

Parameter	Symbol	Value	Units
Junction−to−Case (Drain)	$R_{\theta JC}$	3.5	°C/W
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	45	°C/W

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

5.Electrical Characteristics @ T_J= 25°C (unless otherwise specified)

Parameter	Symbol	Conditions		Min	Typ	Max	Units
OFF CHARACTERISTICS							
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=250μA		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_{DS}=0V	T_J=25°C			1	μA
		V_{DS}=60V	T_J=150°C			10	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS}=0V, V_{GS}=±20V				±100	nA
ON CHARACTERISTICS							
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA		1.5	1.8	2.5	V
Negative Temperature Coefficient	$V_{GS(th)}/T_J$				5.2		mV/°C
Drain−to−Source on Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A			26	39	mΩ
		V_{GS}=4.5V, I_D=10A			33	50	mΩ
Forward Transconductance	g_{FS}	V_{DS}=15V, I_D=10A			8		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{iss}	V_{GS}=0V, V_{DS}=25V, f=1MHz			675		pF
Output Capacitance	C_{oss}				68		pF
Reverse Transfer Capacitance	C_{rss}				47		pF
Total Gate Charge	$Q_{G(TOT)}$	V_{GS}=10V, V_{DS}=48V, I_D=20A			15		nC
Threshold Gate Charge	$Q_{G(TH)}$				1		nC
Gate-to-Source Charge	Q_{GS}				2.2		nC
Gate-to-Drain Charge	Q_{GD}				4.3		nC
Total Gate Charge	$Q_{G(TOT)}$	V_{GS}=4.5V, V_{DS}=48V, I_D=20A			7.6		nC
Gate Resistance	R_G				1.3		Ω

SWITCHING CHARACTERISTICS						
Turn-On Delay Time	$t_{D(on)}$	V_{GS}=10V, V_{DD}=48V I_D=20A, R_G=2.5Ω		6.5		ns
Rise Time	t_r			12.6		ns
Turn-Off Delay Time	$t_{D(off)}$			18.2		ns
Fall Time	t_f			2.4		ns
DRAIN−SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS}=0V, I_D=10A	T_J=25°C	0.87	1.2	V
			T_J=125°C	0.78		V
Reverse Recovery Time	t_{rr}	V_{GS}=0V, dIs/dt=100A/μs I_S=20A		17		ns
Charge Time	t_a			13		ns
Discharge Time	t_b			4		ns
Reverse Recovery Time	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 ≤ 300 μs, duty cycle ≤ 2%.

3. Switching characteristics are independent of operating junction temperatures.

6.1Typical Characterisitics

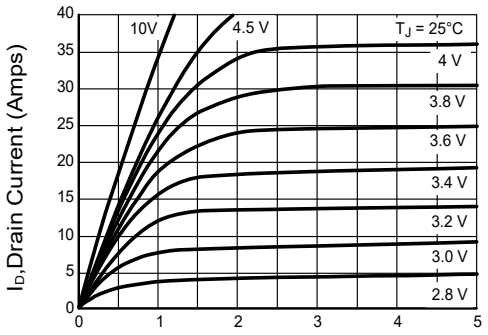


Figure 1: On−Region Characteristics

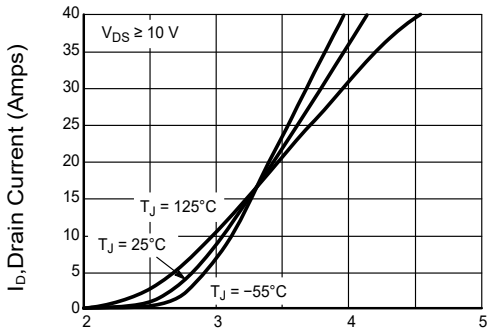


Figure 2: Transfer Characteristics

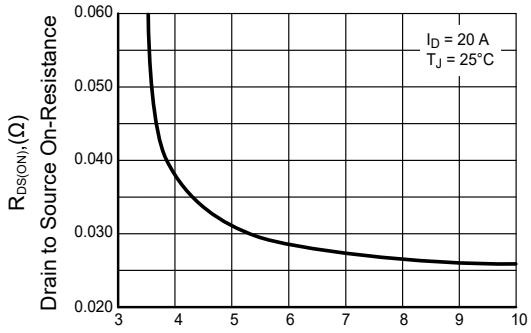


Figure 3: On−Resistance vs. Gate−to−Source Voltage

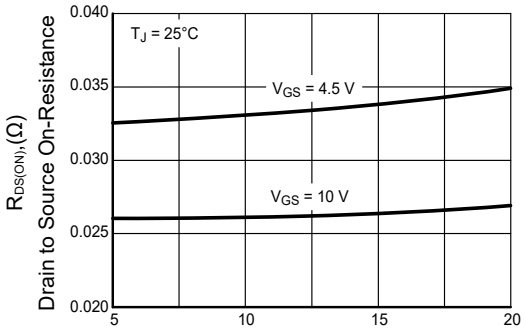


Figure 4: On−Resistance versus Drain Current and Gate Voltage

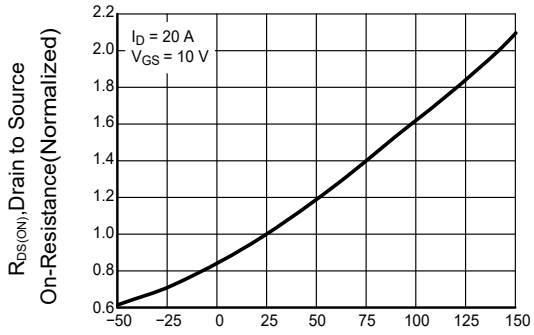


Figure 5: On−Resistance Variation with Temperature

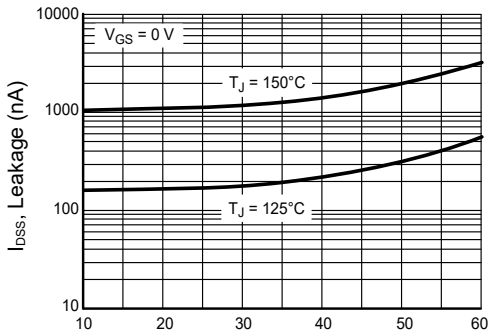


Figure 6: Drain−To−Source Leakage Current versus Voltage

6.2Typical Characterisitics

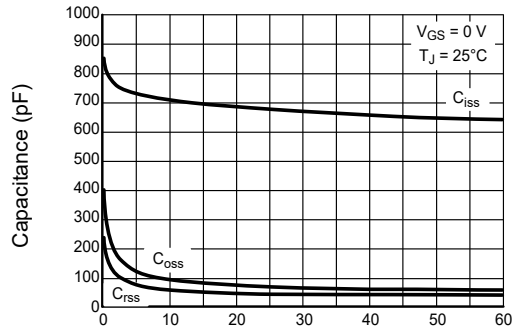


Figure 7: Capacitance Variation

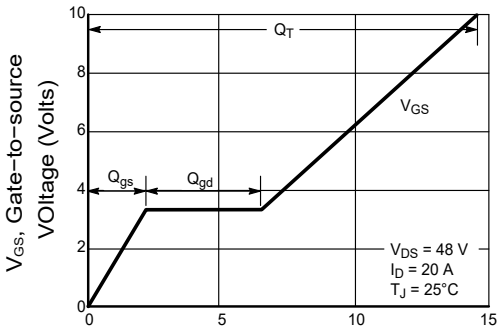


Figure 8: Gate−To−Source and Drain−To−Source Voltage vs. Total Charge

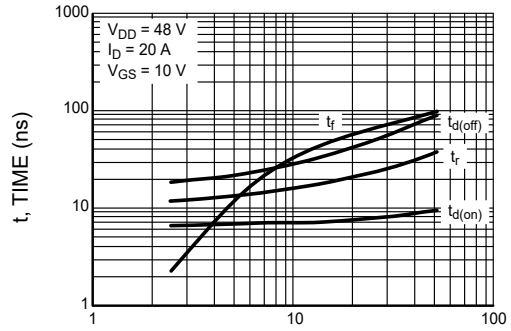


Figure 9: Resistive Switching Time Variation vs. Gate Resistance

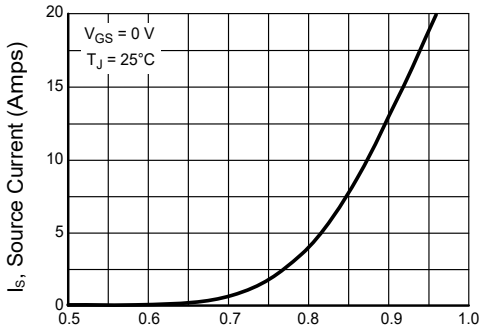


Figure 10: On−Resistance versus Drain Current and Gate Voltage

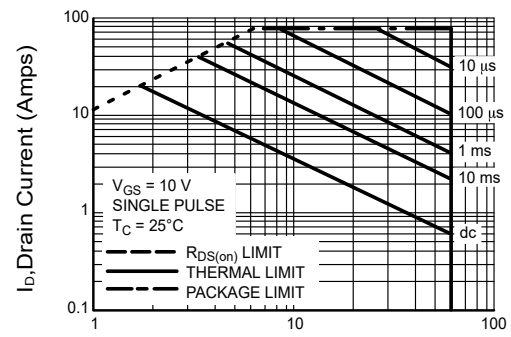


Figure 11: Maximum Rated Forward Biased Safe Operating Area

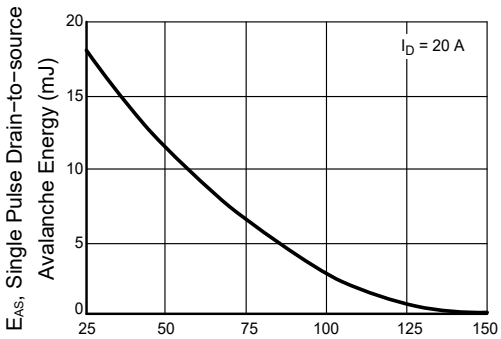


Figure 12: Maximum Avalanche Energy vs. Starting Junction Temperature

6.3Typical Characterisitics

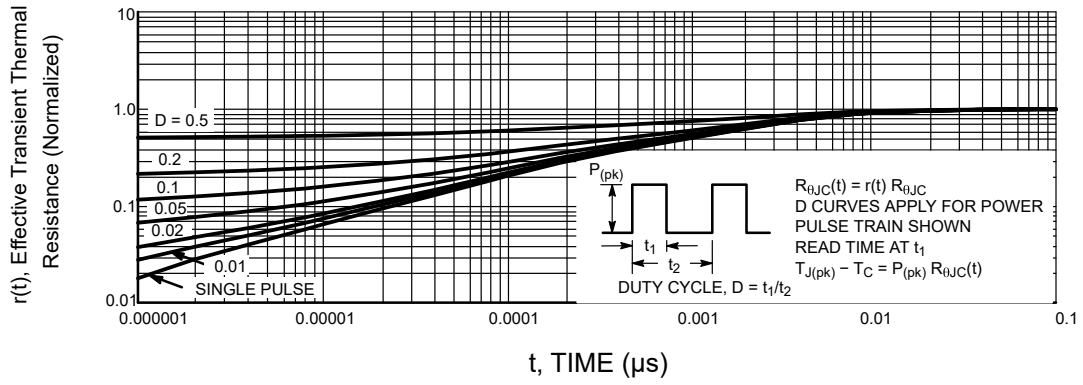
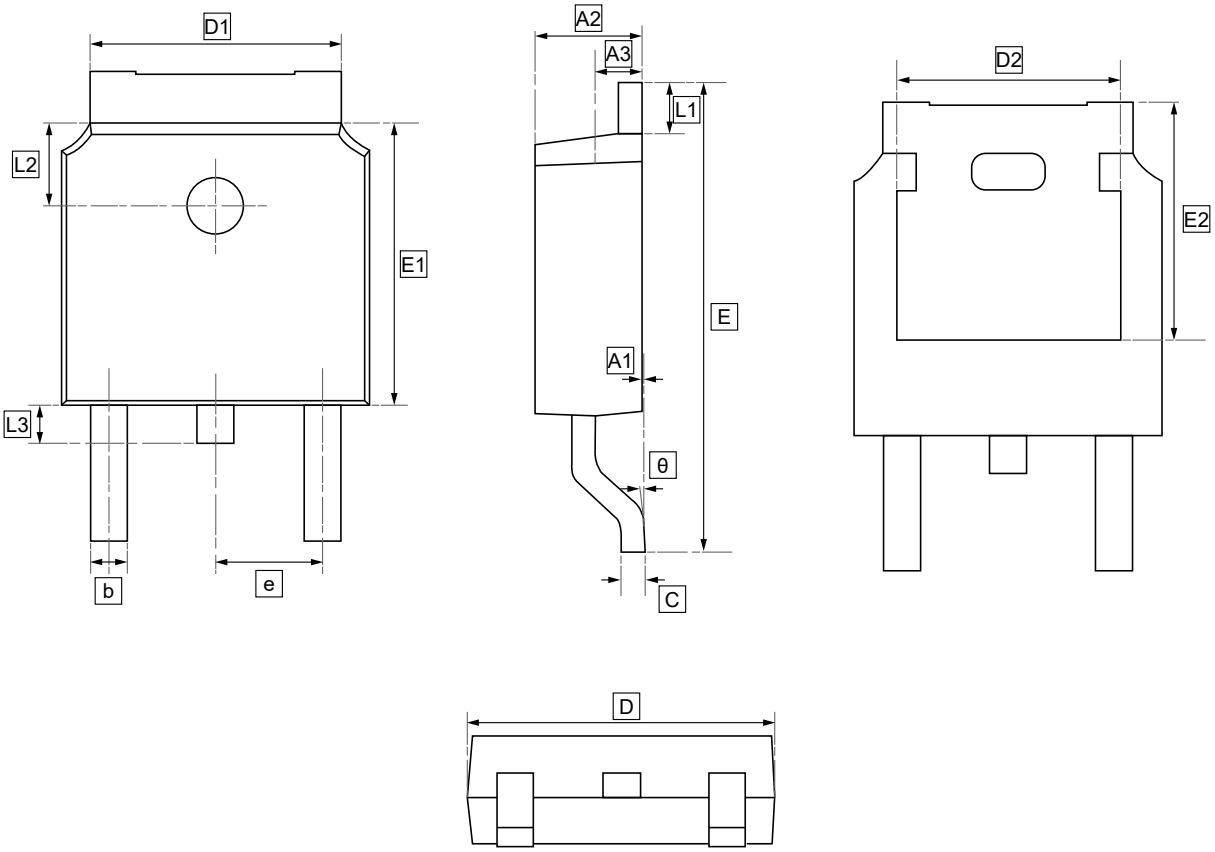


Figure 13: Thermal Response

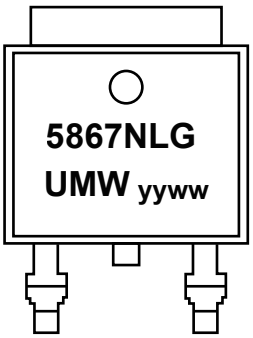
7.TO-252 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
Min	0.00	2.18	0.90	0.65	0.46	6.35	4.95	4.32	9.40	5.97	5.21	2.286	0.89	1.70	0.60	0.00
Max	0.13	2.39	1.10	0.85	0.61	6.73	5.46	4.90	10.41	6.22	5.38	BSC	1.27	1.90	1.00	8.00

8.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW NTD5867NLT4G	TO-252	2500	Tape and reel

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