

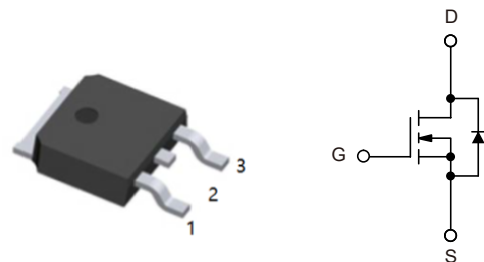
1.Features

- $V_{DS(V)}=60V$
- $I_D=17A$
- $R_{DS(ON)}<28m\Omega(V_{GS}=10V)$
- $R_{DS(ON)}<30m\Omega(V_{GS}=4.5V)$
- Low $R_{DS(ON)}$ to Minimize Conduction Losses
- Low Q_G and Capacitance to Minimize Driver Losses

2.Pinning information

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

TO-252(DPAK)
top view



3.Absolute Maximum Ratings $T_J=25^{\circ}C$

Parameter			Symbol	Value	Units
Drain-to-Source Voltage			V _{DSS}	60	V
Gate-to-Source Voltage – Continuous			V _{GS}	±16	V
Continuous Drain Current R _{θJC} (Notes 1 & 3)	Steady State	T _C =25°C	I _D	17	A
		T _C =100°C		12	A
Continuous Drain Current (R _{θJC}) (Note1)		T _C =25°C	P _D	18	W
		T _C =100°C		9	W
Continuous Drain Current R _{θJA} (Notes 1, 2 & 3)		T _A =25°C	I _D	7	A
		T _A =100°C		5	A
Power Dissipation R _{θJA} (Notes 1 & 2)		T _A =25°C	P _D	2.9	W
		T _A =100°C		1.45	W
Pulsed Drain Current	T _A =25°C, t _p =10μs		I _{DM}	77	A
Operating Junction and Storage Temperature			T _J , T _{STG}	-55 to 175	°C



Source Current (Body Diode)	I_S	20	A
Single Pulse Drain-to-Source Avalanche Energy ($T_J=25^{\circ}\text{C}$, $I_{L(pk)}=1\text{A}$)	E_{AS}	48	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.

4. Thermal resistance rating

Parameter	Symbol	Value	Units
Junction-to-Case (Drain) (Note 1)	$R_{\theta JC}$	8.05	$^{\circ}\text{C/W}$
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	51.6	$^{\circ}\text{C/W}$

1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface-mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.



5. Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			27		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=0V$	$T_J=25^\circ\text{C}$		10	μA
		$V_{DS}=60V$	$T_J=125^\circ\text{C}$		250	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=20V$			100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=15\mu A$	1.2		2.1	V
Negative Temperature Coefficient	$V_{GS(th)}/T_J$			4.4		mV/ $^\circ\text{C}$
Drain-to-Source on Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$		20	28	m Ω
		$V_{GS}=4.5V, I_D=10A$		25	30	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=10A$		20		S
CHARGES AND CAPACITANCES						
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$		400		pF
Output Capacitance	C_{oss}			170		pF
Reverse Transfer Capacitance	C_{rss}			12		pF
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=48V$	$V_{GS}=4.5V$	3.4		nC
		$I_D=10A$	$V_{GS}=10V$	7		nC
Threshold Gate Charge	$Q_{G(TH)}$	$V_{GS}=4.5V, V_{DS}=48V, I_D=10A$		0.9		nC
Gate-to-Source Charge	Q_{GS}			1.5		nC
Gate-to-Drain Charge	Q_{GD}			1.1		nC
Plateau Voltage	V_{GP}			2.9		V



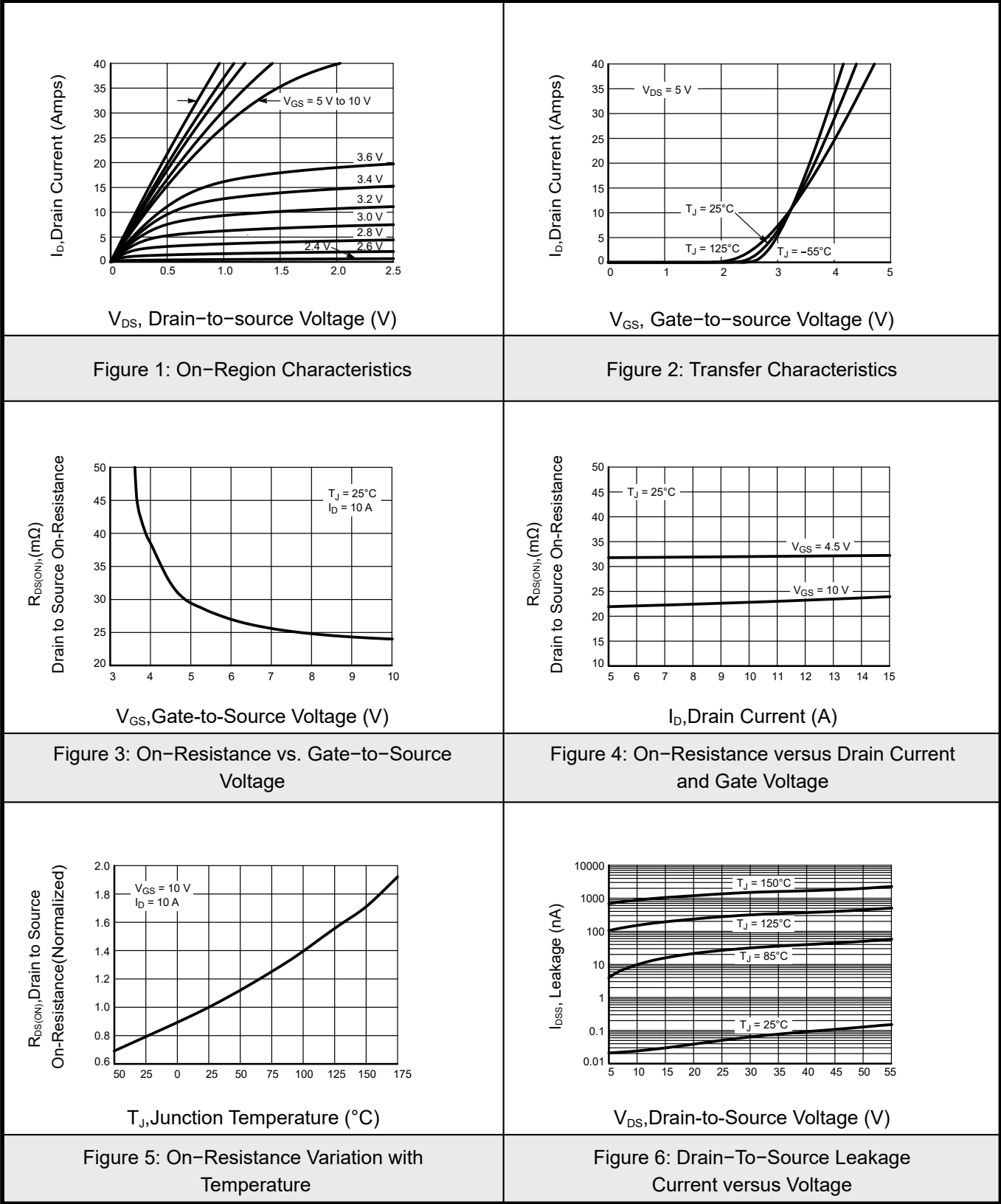
SWITCHING CHARACTERISTICS							
Turn-On Delay Time	$t_{D(on)}$	$V_{GS}=4.5V, V_{DD}=48V$ $I_D=10A, R_G=2.5\Omega$		8		ns	
Rise Time	t_r			42		ns	
Turn-Off Delay Time	$t_{D(off)}$			11		ns	
Fall Time	t_f			24		ns	
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	$V_{GS}=0V$	$T_J=25^{\circ}C$		0.9	1.2	V
		$I_D=10A$	$T_J=125^{\circ}C$		0.8		V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, dI_S/dt=100A/\mu s$ $I_S=10A$		17		ns	
Charge Time	t_a			8		ns	
Discharge Time	t_b			9		ns	
Reverse Recovery Time	Q_{rr}			10		nC	

4. Pulse Test: Pulse Width $\leq 300 \mu s$, Duty Cycle $\leq 2\%$.

5. Switching characteristics are independent of operating junction temperatures.



6.1 Typical Characteristics





6.2 Typical Characteristics

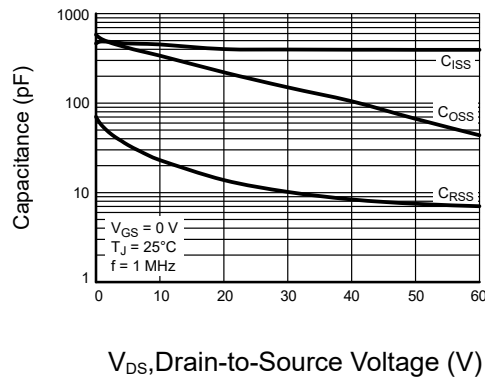


Figure 7: Capacitance Variation

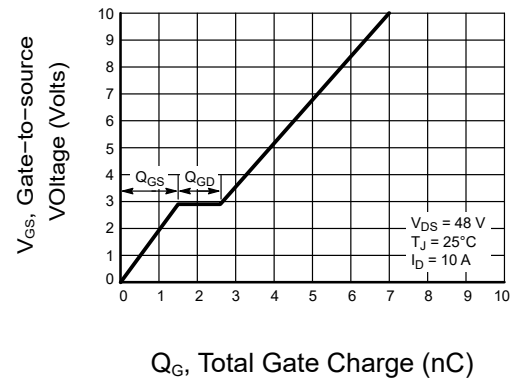


Figure 8: Gate-To-Source and Drain-To-Source Voltage vs. Total Charge

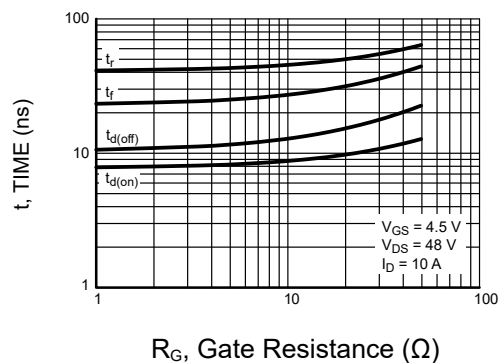


Figure 9: Resistive Switching Time Variation vs. Gate Resistance

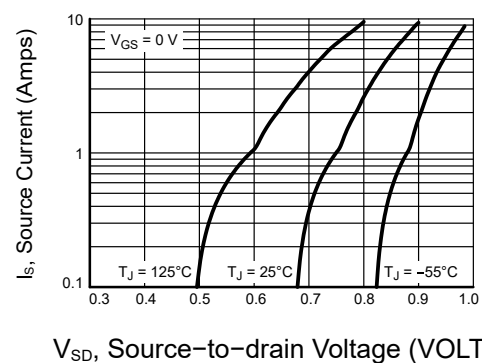


Figure 10: On-Resistance versus Drain Current and Gate Voltage

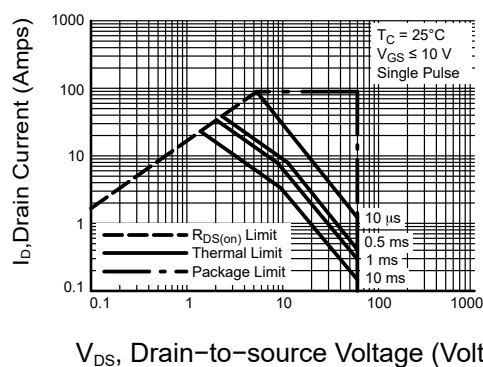


Figure 11: Maximum Rated Forward Biased Safe Operating Area

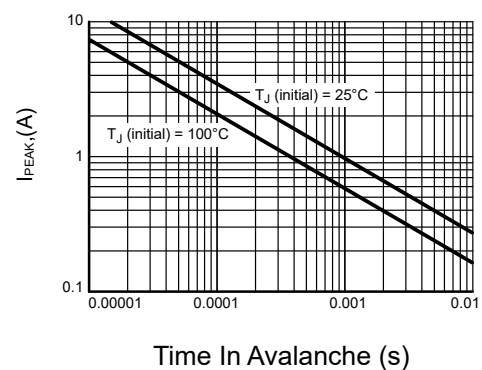


Figure 12: Maximum Avalanche Energy vs. Starting Junction Temperature



6.3Typical Characteristics

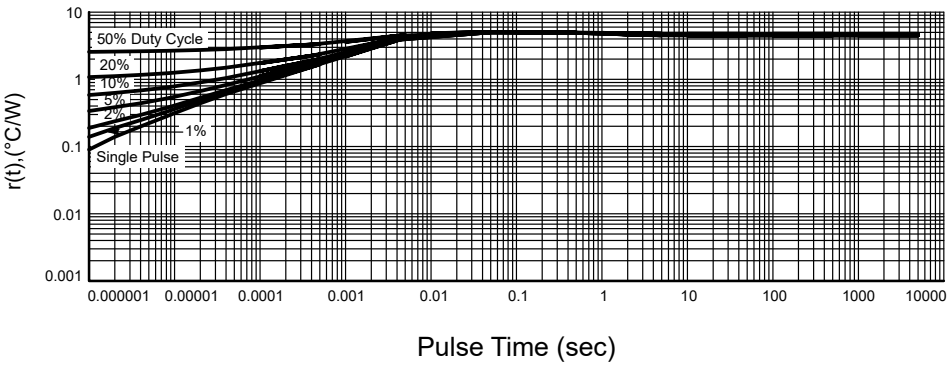
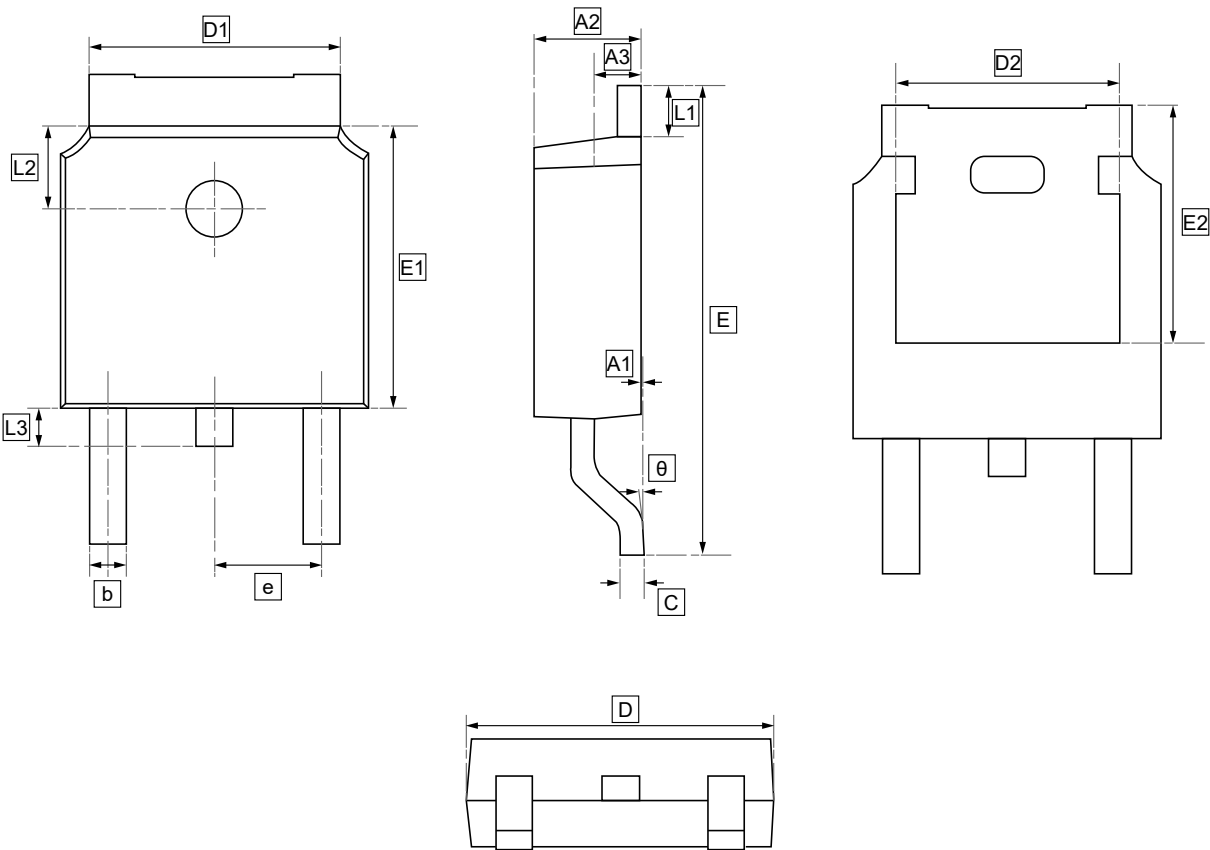


Figure 13: Thermal Response



7.TO-252 Package Outline Dimensions

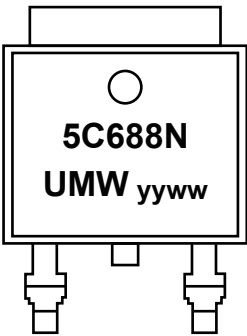


DIMENSIONS (mm are the original dimensions)

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 BSC	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		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 NVD5C688NLT4G	TO-252	2500	Tape and reel



9.Disclaimer

UMW reserves the right to make changes to all products, specifications. Customers should obtain the latest version of product documentation and verify the completeness and currency of the information before placing an order.

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