

1.Description

- Low $R_{DS(ON)}$ to Minimize Conduction Losses
- Low Capacitance to Minimize Driver Losses
- Optimized Gate Charge to Minimize Switching Losses

2.2Features

- VCore Applications
- DC-DC Converters

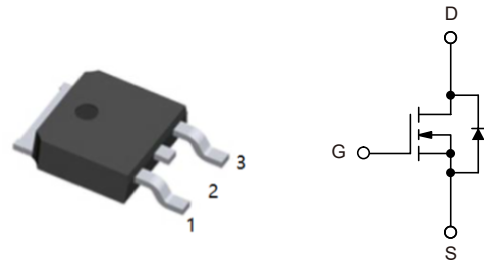
2.1Features

- $V_{DS(V)}=30V$
- $I_D=73A(V_{GS}=10V)$
- $R_{DS(ON)}<6.2m\Omega(V_{GS}=10V)$
- $R_{DS(ON)}<9.3m\Omega(V_{GS}=4.5V)$

3.Pinning information

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

TO-252(DPAK)
top view



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

Parameter			Symbol	Value	Units
Drain-to-Source Voltage			V _{DSS}	30	V
Gate-to-Source Voltage			V _{GS}	±20	V
Continuous Drain Current (R _{θJA}) (Note 1)	Steady State	T _A =25°C	I _D	14	A
		T _A =85°C		10.9	A
Power Dissipation (R _{θJA}) (Note 1)		T _A =25°C	P _D	2	W
Continuous Drain Current (R _{θJA}) (Note 2)		T _A =25°C	I _D	11.2	A
		T _A =85°C		8.7	A
Power Dissipation (R _{θJA}) (Note 2)		T _A =25°C	P _D	1.3	W



Continuous Drain Current ($R_{\theta JC}$) (Note 1)	Steady State	$T_C=25^{\circ}\text{C}$	I_D	73	A
		$T_C=85^{\circ}\text{C}$		56	A
Power Dissipation ($R_{\theta JC}$) (Note 1)		$T_C=25^{\circ}\text{C}$	P_D	54.5	W
Pulsed Drain Current	$t_p=10\mu\text{s}$	$T_C=25^{\circ}\text{C}$	I_{DM}	146	A
Current Limited by Package		$T_A=25^{\circ}\text{C}$	$I_{DmaxPkg}$	45	A
Junction and Storage Temperature		$T_A=25^{\circ}\text{C}$	T_J, T_{STG}	-55 to 175	$^{\circ}\text{C}$
Source Current (Body Diode)			I_S	45	A
Drain to Source dv/dt			dv/dt	6	V/ns
Single Pulse Drain-to-Source Avalanche Energy ($T_J=25^{\circ}\text{C}$, $V_{DD}=50\text{V}$, $V_{GS}=10\text{V}$, $I_L=15\text{A}_{pk}$, $L=1\text{mH}$, $R_G=25\Omega$)			E_{AS}	112.5	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	$^{\circ}\text{C}$

5. Thermal resistance rating

Parameter	Symbol	Value	Units
Junction-to-Case (Drain)	$R_{\theta JC}$	1.9	$^{\circ}\text{C/W}$
Junction-to-TAB (Drain)	$R_{\theta JC-TAB}$	3.5	$^{\circ}\text{C/W}$
Junction-to-Ambient-Steady State (Note 1)	$R_{\theta JA}$	56.6	$^{\circ}\text{C/W}$
Junction-to-Ambient-Steady State (Note 2)	$R_{\theta JA}$	106.6	$^{\circ}\text{C/W}$



6. 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	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			22		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=0V$	$T_J=25^\circ\text{C}$		1	μA
		$V_{DS}=20V$	$T_J=125^\circ\text{C}$		10	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.45		2.5	V
Negative Temperature Coefficient	$V_{GS(th)}/T_J$			5.3		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS}=10V$	$I_D=30A$	5.2	6.2	m Ω
		$V_{GS}=4.5V$	$I_D=30A$	7.3	9.3	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=1.5V, I_D=15A$		55		S
CHARGES AND CAPACITANCES						
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=12V, f=1\text{MHz}$		1563		pF
Output Capacitance	C_{oss}			405		pF
Reverse Transfer Capacitance	C_{rss}			200		pF
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=4.5V, V_{DS}=15V, I_D=30A$		12.8	19.2	nC
Threshold Gate Charge	$Q_{G(TH)}$			1.3		nC
Gate-to-Source Charge	Q_{GS}			4.7		nC
Gate-to-Drain Charge	Q_{GD}			5.2		nC
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=10V, V_{DS}=15V, I_D=30A$		25.7		nC

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



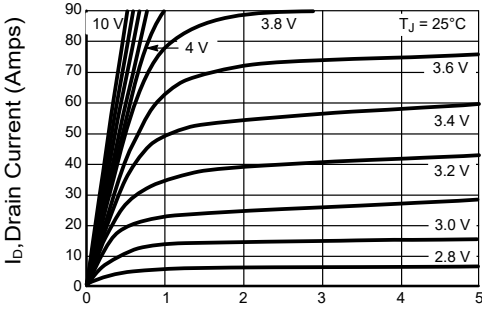
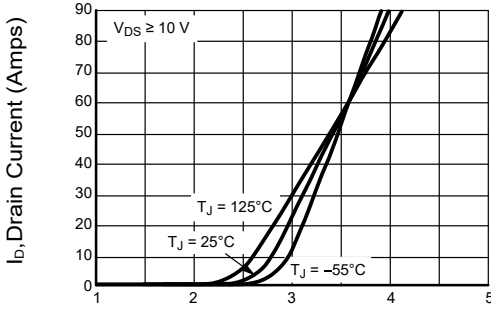
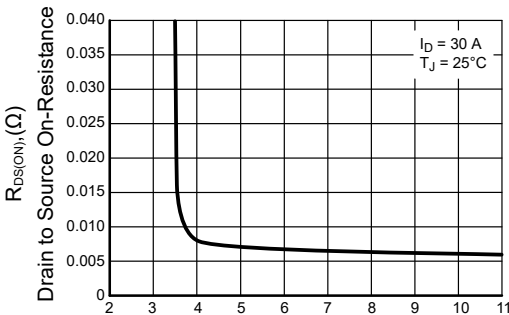
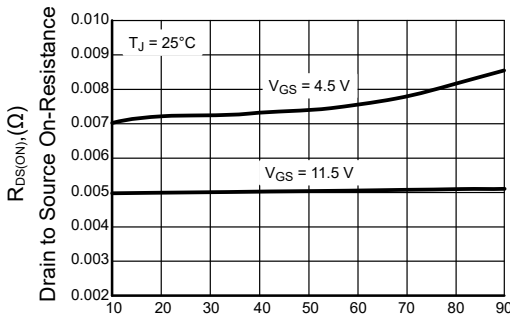
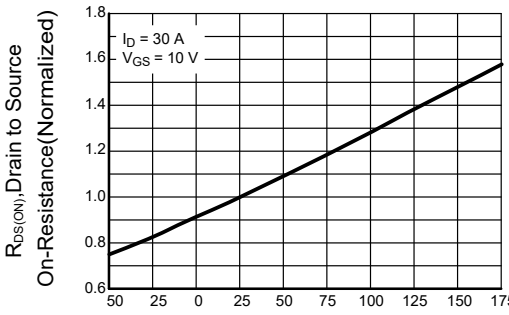
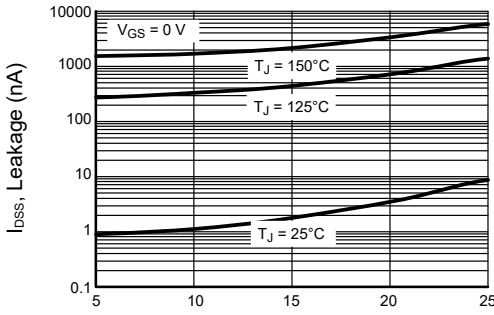
SWITCHING CHARACTERISTICS (Note 4)							
Turn-On Delay Time	$t_{D(on)}$	$V_{GS}=4.5V, V_{DS}=15V$ $I_D=15A, R_G=3\Omega$			12.6		ns
Rise Time	t_r				20.2		ns
Turn-Off Delay Time	$t_{D(off)}$				16.4		ns
Fall Time	t_f				5.1		ns
Turn-On Delay Time	$t_{D(on)}$	$V_{GS}=11.5V, V_{DS}=15V$ $I_D=15A, R_G=3\Omega$			7.7		ns
Rise Time	t_r				17.3		ns
Turn-Off Delay Time	$t_{D(off)}$				23.8		ns
Fall Time	t_f				2.8		ns
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	$V_{GS}=0V$	$T_J=25^{\circ}C$		0.87	1.2	V
		$I_D=30A$	$T_J=125^{\circ}C$		0.73		V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, dI_S/dt=100A/\mu s$ $I_S=30A$			11.6		ns
Charge Time	t_a				7.8		ns
Discharge Time	t_b				3.7		ns
Reverse Recovery Time	Q_{rr}				3		nC
PACKAGE PARASITIC VALUES							
Source Inductance	L_S	$T_A=25^{\circ}C$			2.49		nH
Drain inductance, DPAK	L_D				0.0164		nH
Drain Inductance, IPAK	L_D				1.88		nH
Gate Inductance	L_G				3.46		nH
Gate Resistance	R_G				0.7		Ω

3. Pulse Test: pulse width $\leq 300 \mu s$, duty cycle $\leq 2\%$.

4. Switching characteristics are independent of operating junction temperatures.

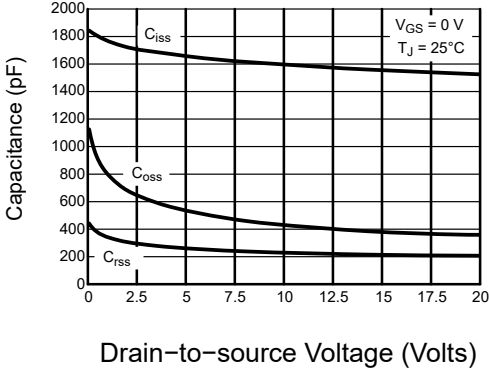
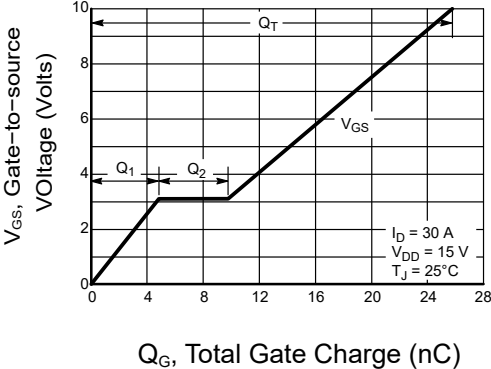
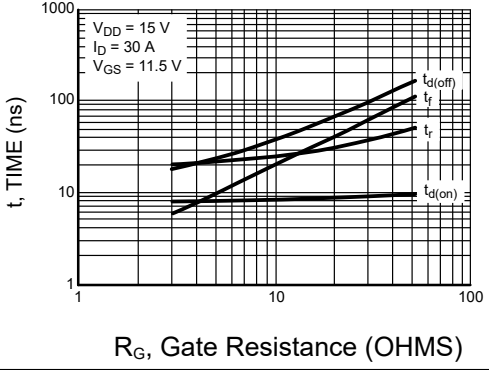
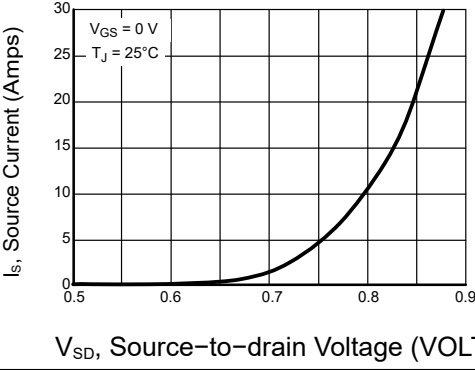
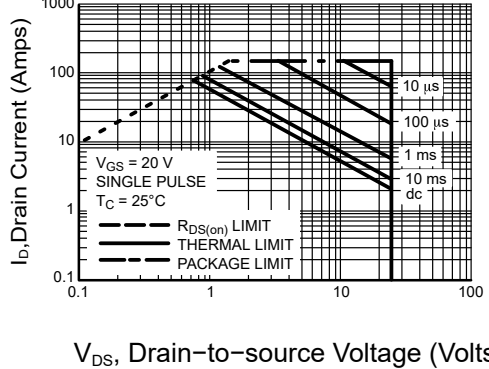
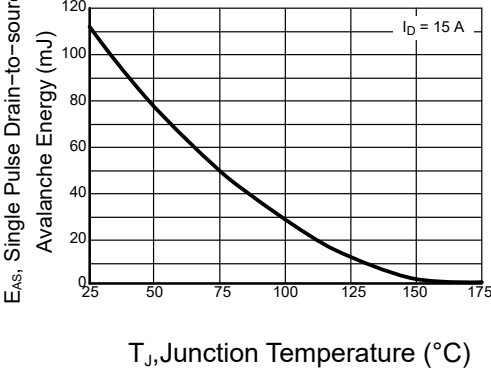


7.1 Typical Characteristics

 I_D, Drain Current (Amps) V_{DS}, Drain-to-source Voltage (Volts)	 I_D, Drain Current (Amps) V_{GS}, Gate-to-source Voltage (Volts)
Figure 1: On-Region Characteristics	Figure 2: Transfer Characteristics
 $R_{DS(on)}$, (Ω) Drain to Source On-Resistance V_{GS}, Gate-to-Source Voltage (V)	 $R_{DS(on)}$, (Ω) Drain to Source On-Resistance I_D, Drain Current (Amps)
Figure 3: On-Resistance vs. Gate-to-Source Voltage	Figure 4: On-Resistance versus Drain Current and Gate Voltage
 $R_{DS(on)}$, Drain to Source On-Resistance (Normalized) T_J, Junction Temperature (°C)	 I_{loss}, Leakage (nA) V_{DS}, Drain-to-Source Voltage (V)
Figure 5: On-Resistance Variation with Temperature	Figure 6: Drain-To-Source Leakage Current versus Voltage

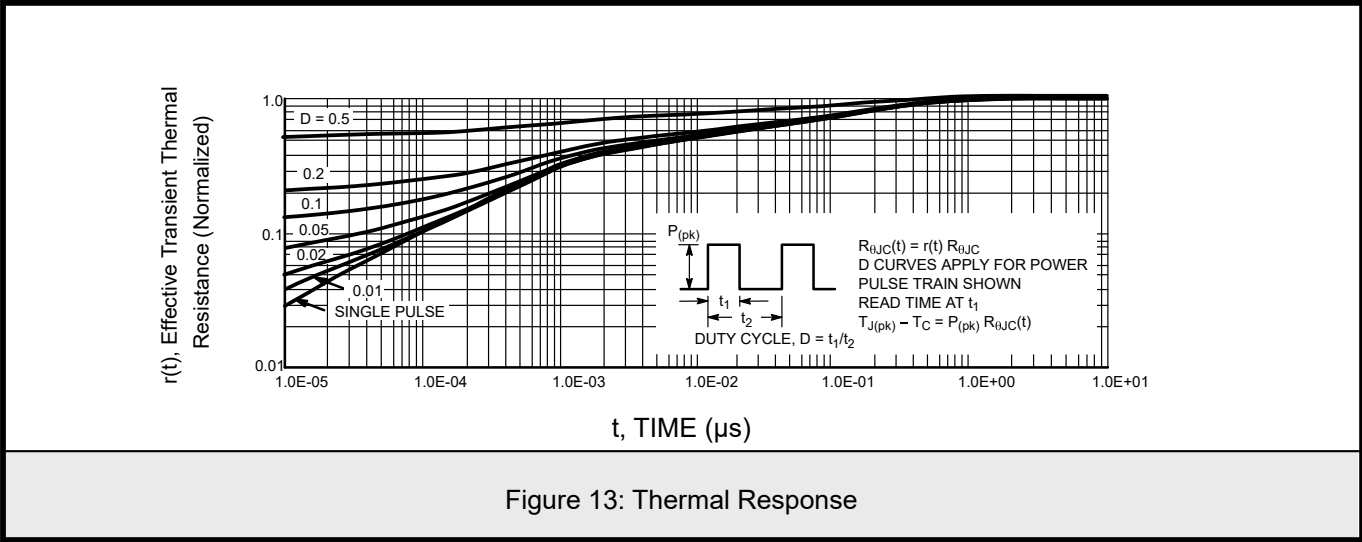


7.2Typical Characteristics

 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

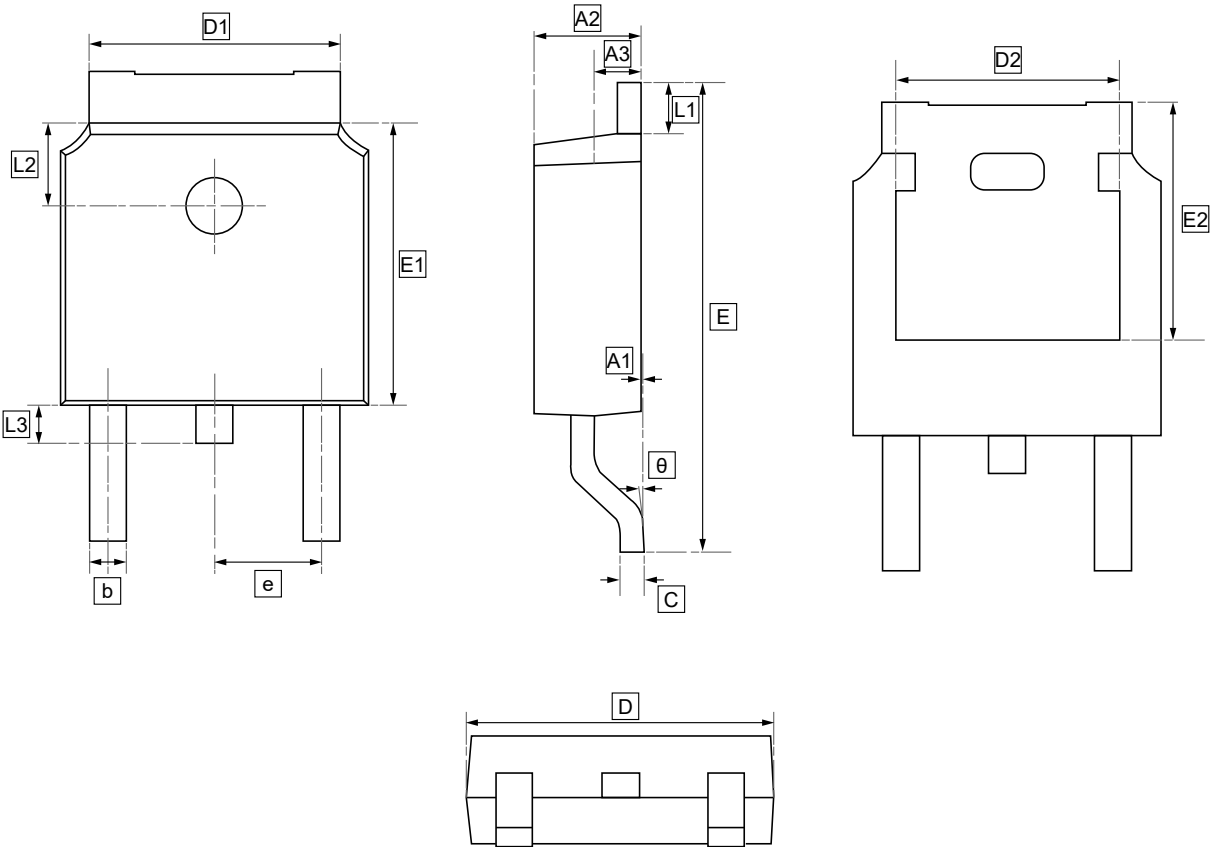


7.3Typical Characteristics





8.TO-252 Package Outline Dimensions

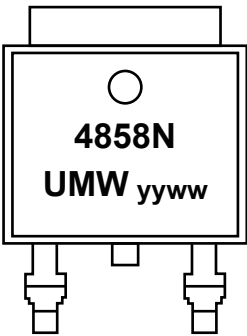


DIMENSIONS (mm are the original dimensions)

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



9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW NTD4858NT4G	TO-252	2500	Tape and reel



10.Disclaimer

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