

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

- CPU Power Delivery
- DC-DC Converters

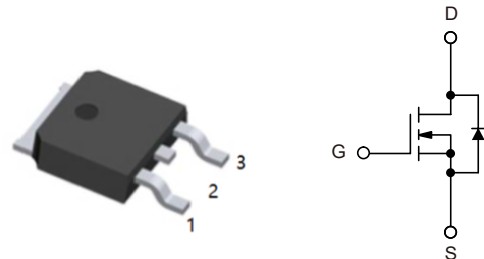
2.1Features

- $V_{DS(V)}=30V$
- $I_D=88A(V_{GS}=10V)$
- $R_{DS(ON)}<5m\Omega(V_{GS}=10V)$
- $R_{DS(ON)}<7.4m\Omega(V_{GS}=4.5V)$

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	17.4	A
		T _A =85°C		13.5	A
Power Dissipation (R _{θJA}) (Note 1)		T _A =25°C	P _D	2.65	W
Continuous Drain Current (R _{θJA}) (Note 2)		T _A =25°C	I _D	12.7	A
		T _A =85°C		9.8	A
Power Dissipation (R _{θJA}) (Note 2)		T _A =25°C	P _D	1.41	W



Continuous Drain Current ($R_{\theta JC}$) (Note 1)	Steady State	$T_C=25^{\circ}\text{C}$	I_D	95	A
		$T_C=85^{\circ}\text{C}$		73	A
Power Dissipation ($R_{\theta JC}$) (Note 1)		$T_C=25^{\circ}\text{C}$	P_D	79	W
Pulsed Drain Current	$t_p=10\mu\text{s}$	$T_C=25^{\circ}\text{C}$	I_{DM}	175	A
Current Limited by Package		$T_A=25^{\circ}\text{C}$	$I_{DmaxPkg}$	45	A
Operating 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	55	A
Source Current (Body Diode) Pulsed $t_p=20\mu\text{s}$			I_{SM}	175	A
Drain to Source dv/dt			dv/dt	6	V/ns
Single Pulse Drain-to-Source Avalanche Energy ($V_{DD}=24\text{ V}, V_{GS}=10\text{V}, L=1\text{mH}, I_{L(pk)}=24\text{A}, R_G=25\Omega$)			E_{AS}	288	mJ
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	$^{\circ}\text{C}$

5. Thermal resistance

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	$V_{(BR)DSS}/T_J$			27		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=0V$	$T_J=25^\circ\text{C}$		1	μA
		$V_{DS}=24V$	$T_J=125^\circ\text{C}$		10	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.5		2.5	V
Negative Temperature Coefficient	$V_{GS(th)}/T_J$			5.86		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS}=10 \text{ to } 11.5V$	$I_D=30A$	4.3	5	m Ω
			$I_D=15A$	4.2		m Ω
		$V_{GS}=4.5V$	$I_D=30A$	6	7.4	m Ω
			$I_D=15A$	5.8		m Ω
Forward Transconductance	g_{FS}	$V_{DS}=15V, I_D=15A$		17		S
CHARGES AND CAPACITANCES						
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=12V, f=1MHz$		2865		pF
Output Capacitance	C_{oss}			610		pF
Reverse Transfer Capacitance	C_{rss}			338		pF
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=4.5V, V_{DS}=15V, I_D=30A$		20.5	26	nC
Threshold Gate Charge	$Q_{G(TH)}$			4.05		nC
Gate-to-Source Charge	Q_{GS}			8.28		nC
Gate-to-Drain Charge	Q_{GD}			8.36		nC
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS}=11.5V, V_{DS}=15V, I_D=30A$		48		nC



SWITCHING CHARACTERISTICS							
Turn-On Delay Time	t _{D(on)}	V _{GS} =4.5V, V _{DS} =15V I _D =15A, R _G =3Ω		17.2		ns	
Rise Time	t _r			20.3		ns	
Turn-Off Delay Time	t _{D(off)}			20.8		ns	
Fall Time	t _f			8		ns	
Turn-On Delay Time	t _{D(on)}	V _{GS} =11.5V, V _{DS} =15V I _D =15A, R _G =3Ω		10.8		ns	
Rise Time	t _r			20.5		ns	
Turn-Off Delay Time	t _{D(off)}			30.8		ns	
Fall Time	t _f			4.4		ns	
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V _{SD}	V _{GS} =0V	T _J =25°C		0.87	1.2	V
		I _D =30A	T _J =125°C		0.76		V
Reverse Recovery Time	t _{rr}	V _{GS} =0V, dI _S /dt=100A/μs I _S =30A			25.7		ns
Charge Time	t _a				13.1		ns
Discharge Time	t _b				12.6		ns
Reverse Recovery Time	Q _{rr}				18		nC
PACKAGE PARASITIC VALUES							
Source Inductance	L _S	T _A =25°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				0.8		Ω

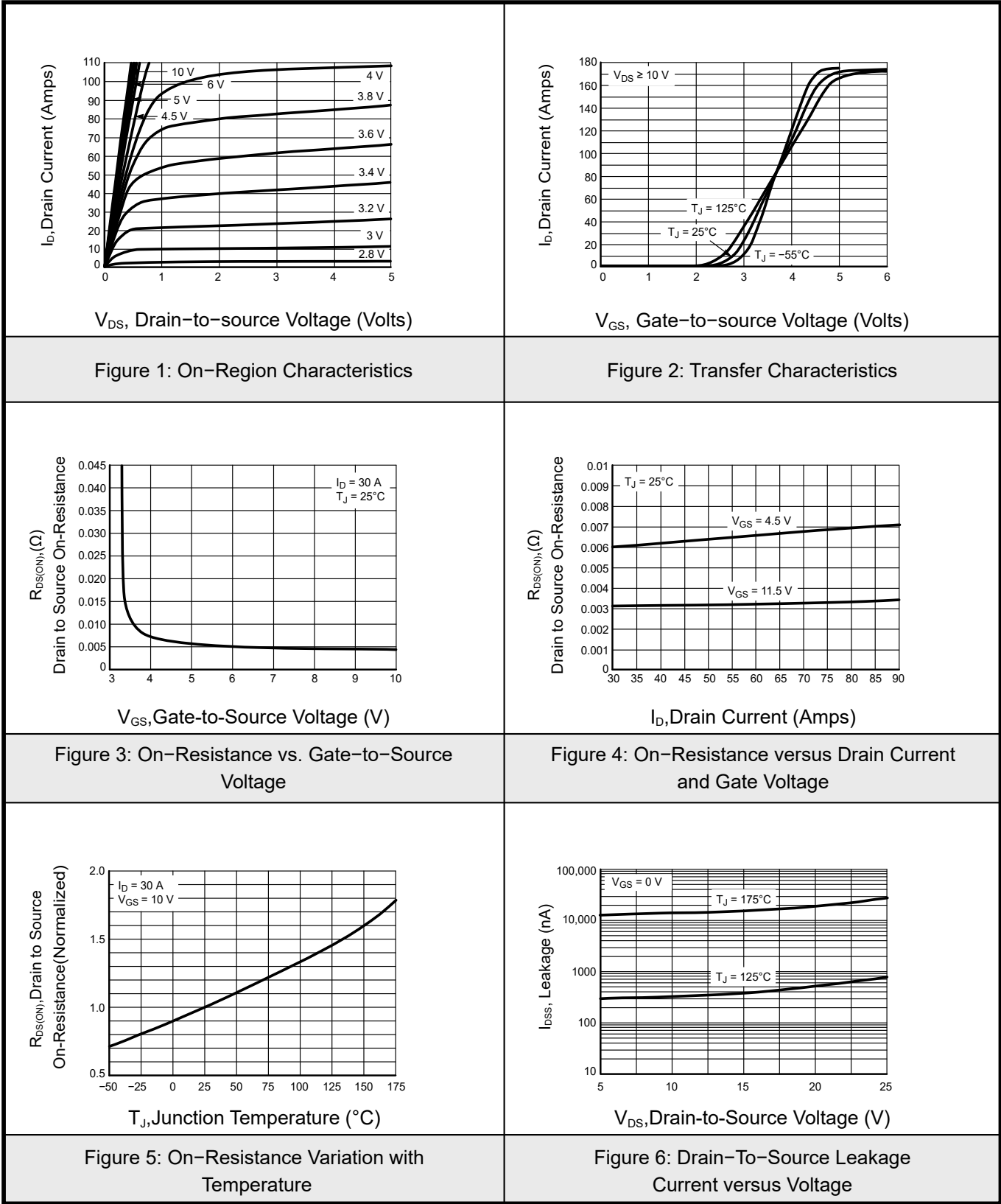
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

4. Switching characteristics are independent of operating junction temperatures.

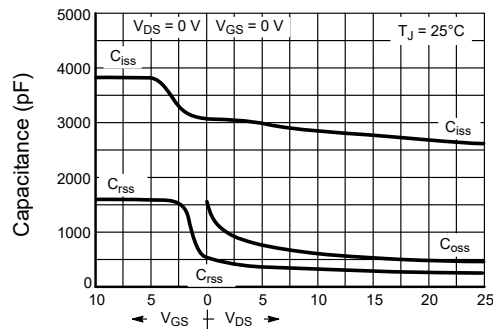


7.1 Typical Characteristics





7.2 Typical Characteristics



Gate-to-source Or Drain-to-source Voltage (Volts)

Figure 7: Capacitance Variation

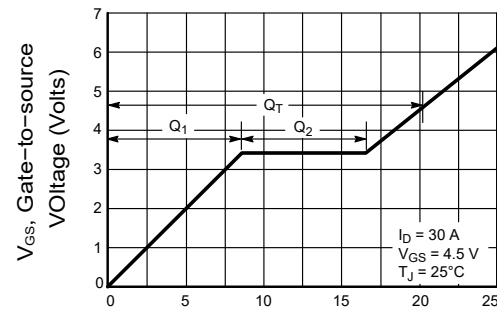
 Q_G , Total Gate Charge (nC)

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

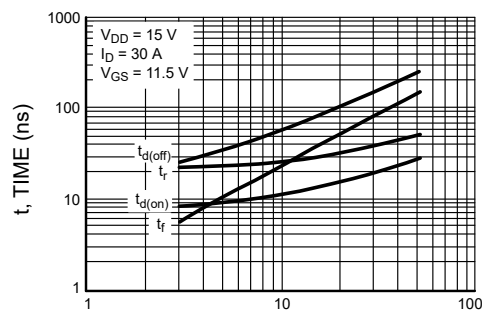
 R_G , Gate Resistance (OHMS)

Figure 9: Resistive Switching Time Variation vs. Gate Resistance

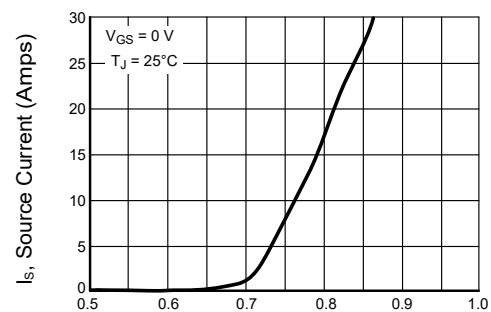
 V_{SD} , Source-to-drain Voltage (VOLTS)

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

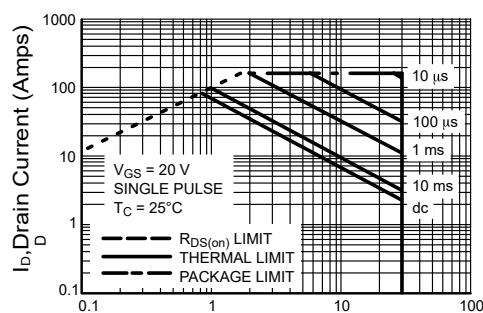
 V_{DS} , Drain-to-source Voltage (Volts)

Figure 11: Maximum Rated Forward Biased Safe Operating Area

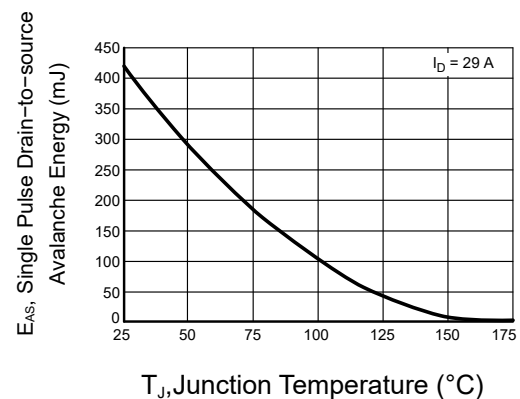


Figure 12: Maximum Avalanche Energy vs. Starting Junction Temperature



7.3Typical Characteristics

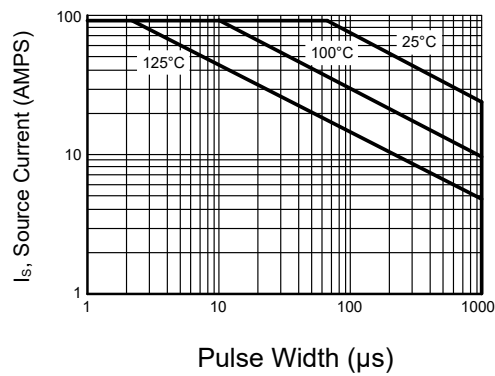


Figure 13: Avalanche Characteristics

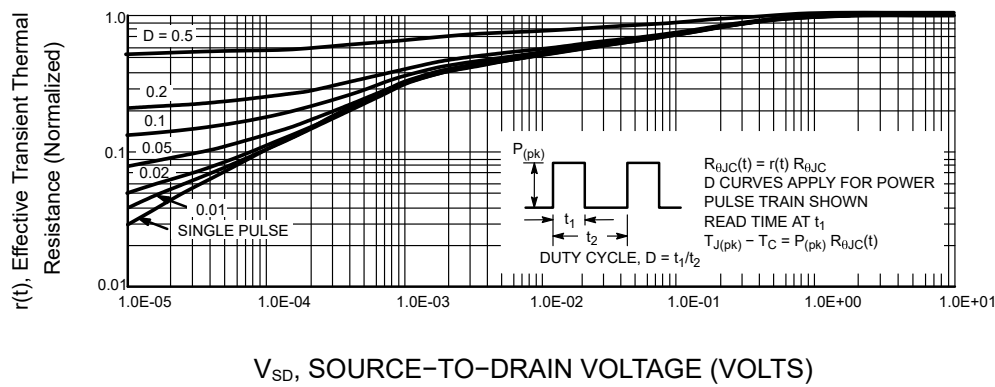
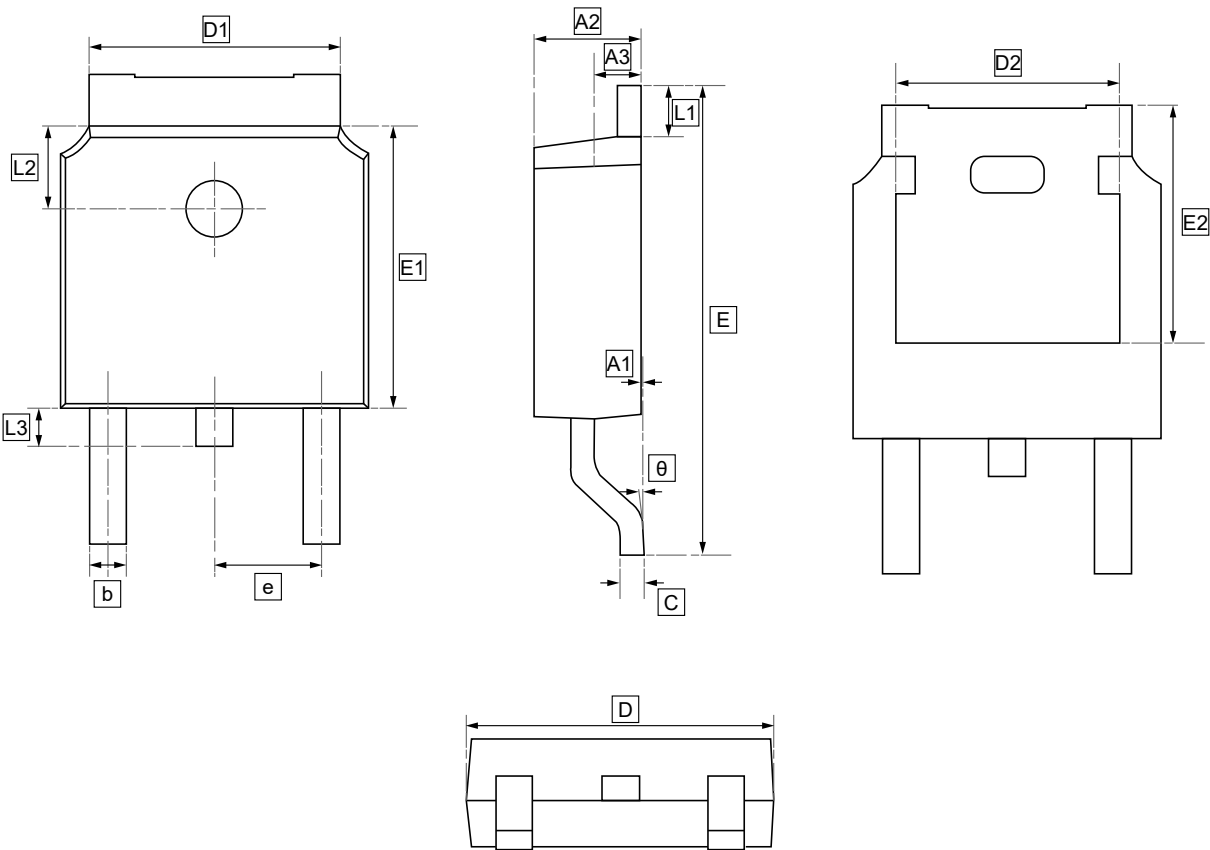


Figure 14: Diode Forward Voltage versus Current



8.TO-252 Package Outline Dimensions

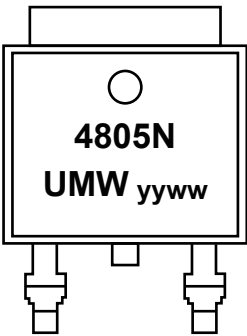


DIMENSIONS (mm are the original dimensions)

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 NTD4805NT4G	TO-252	2500	Tape and reel



10.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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