UMW FQD13N10LTM

100V N-Channel MOSFET

1.Description

This advanced MOSFET technology has been especially tailored to reduce on-state resistance, and to provide superior switching performance and high avalanche energy strength. These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

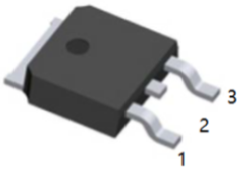
2.Features

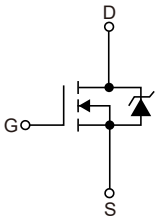
- $V_{DS\ (V)}$=100V
- I_D=5A(V_{GS}=10V)
- $R_{DS(ON)}$<180mΩ(V_{GS}=10V)

3.Pinning information

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

TO-252(DPAK)
top view





4.Absolute Maximum Ratings T_C= 25°C

Parameter			Symbol	Rating	Units
Drain - Source Voltage			V_{DSS}	100	V
Drain Current - Continuous	T_C=25°C		I_D	10	A
- Continuous	T_C=100°C			6.3	A
- Pulsed		(Note 1)	I_{DM}	40	A
Gate-Source Voltage			V_{GSS}	±20	V
Single Pulse Avalanche Energy		(Note 2)	E_{AS}	95	mJ
Avalanche Current		(Note 1)	I_{AR}	10	A
Repetitive Avalanche Energy		(Note 1)	E_{AR}	4	mJ
Peak Diode Recovery dv/dt		(Note 3)	dv/dt	6	V/ns

Power Dissipation (T_A=25°C)	P_D	2.5	W
Power Dissipation (T_C=25°C)		40	W
- Derate above 25°C		0.32	W/°C
Operating and Storage Temperature Range	T_J,T_{STG}	-55 to 150	°C
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	300	°C

5.Thermal Characteristics

Parameter	Symbol	Rating	Units
Thermal Resistance, Junction to Case, Max	$R_{\theta JC}$	3.13	°C/W
Thermal Resistance, Junction to Ambient (Minimum Pad of 2-oz Copper), Max	$R_{\theta JA}$	110	°C/W
Thermal Resistance, Junction to Ambient (*1 in^2 Pad of 2-oz Copper), Max	$R_{\theta JA}$	50	°C/W

6.Electrical Characteristic (T_C=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	100			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=250μA Referenced to 25°C		0.09		V/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=100V, V_{GS}=0V			1	μA
		V_{GS}=80V, T_C=125°C			10	μA
Gate-Body Leakage Current, Forward	I_{GSSF}	V_{GS}=20V, V_{DS}=0V			100	nA
Gate-Body Leakage Current, Reverse	I_{GSSR}	V_{GS}=-20V, V_{DS}=0V			-100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1		2	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=5A		142	180	mΩ
		V_{GS}=5V, I_D=5A		158	200	mΩ
Forward Transconductance	g_{FS}	V_{DS}=30V, I_D=5A		8.7		S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=25V, V_{GS}=0V, f=1MHz		400	520	pF
Output Capacitance	C_{oss}			95	125	pF
Reverse Transfer Capacitance	C_{rss}			20	25	pF
Switching Characteristics						
Turn-On DelayTime	$t_{D(on)}$	V_{DD}=50V, I_D=12.8A R_G=25Ω (Note 4)		7.5	25	ns
Turn-On Rise Time	t_r			220	450	ns
Turn-Off DelayTime	$t_{D(off)}$			22	55	ns
Turn-Off Fall Time	t_f			72	150	ns
Total Gate Charge	Q_g	V_{DS}=80V, I_D=12.8A V_{GS}=5V (Note 4)		8.7	12	nC
Gate to Source Charge	Q_{gs}			2		nC
Gate to Drain Charge	Q_{gd}			5.3		nC

Drain–Source Diode Characteristics						
Maximum Continuous Drain-Source Diode Forward Current	I_S				10	A
Maximum Pulsed Drain-Source Diode Forward Current	I_{SM}				40	A
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=10A			1.5	V
Reverse Recovery Time	t_{rr}	V_{GS}=0V, I_S=12.8A		75		ns
Reverse Recovery Charge	Q_{rr}	dI_F/dt =100A/μs		0.17		μC

Notes:

1. Repetitive rating : pulse-width limited by maximum junction temperature.
2. L=1.43mH, I_{AS}=10A, V_{DD}=25V, R_G=25Ω, starting T_J=25°C.
3. I_{SD} ≤12.8A, di/dt≤300 A/μs, V_{DD} ≤ BV_{DSS}, starting T_J=25°C.
4. Essentially independent of operating temperature.

7.1Typical characteristic

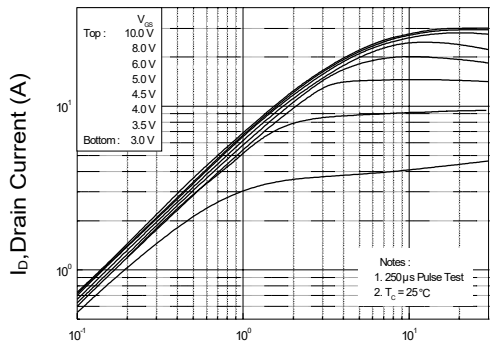


Figure 1: Output Characteristics

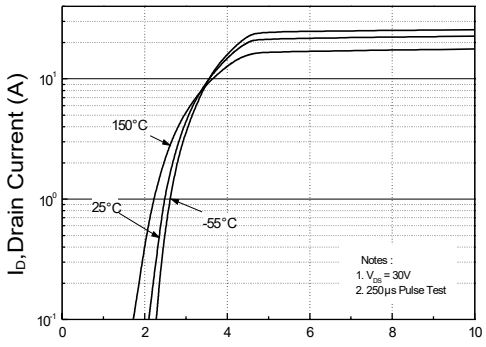


Figure 2: Transfer Characteristics

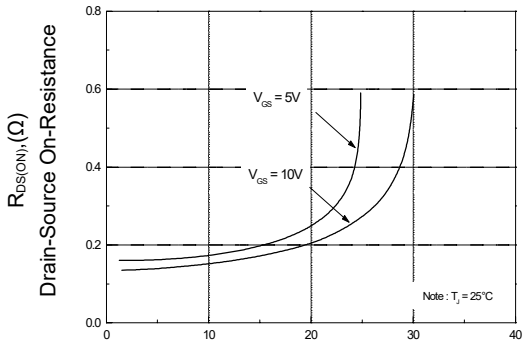


Figure 3: On-Resistance vs.
Drain Current and Gate Voltage

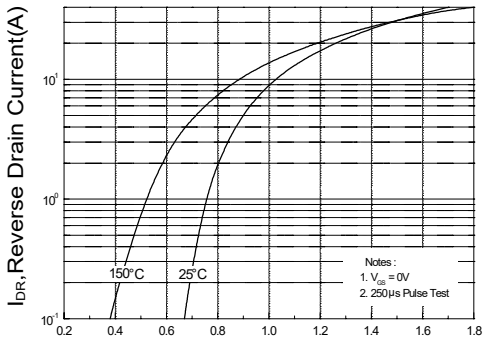


Figure 4: Body Diode Forward VoltageVariation vs.
Source Currentand Temperature

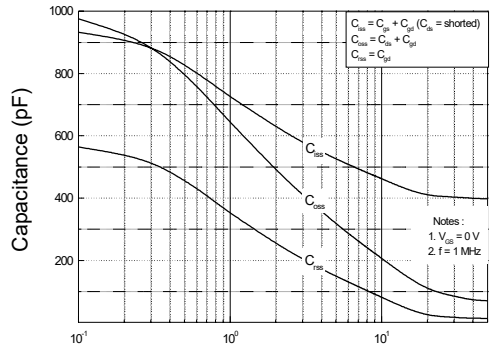


Figure 5: Capacitance Characteristics

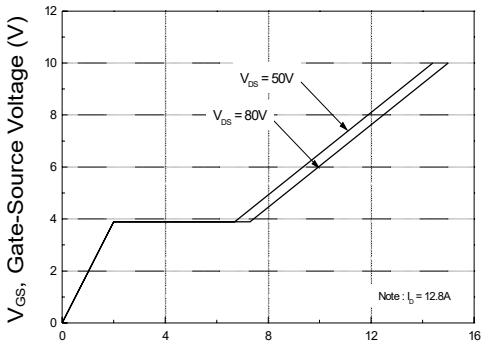


Figure 6: Gate Charge Characteristics

7.2Typical characteristic

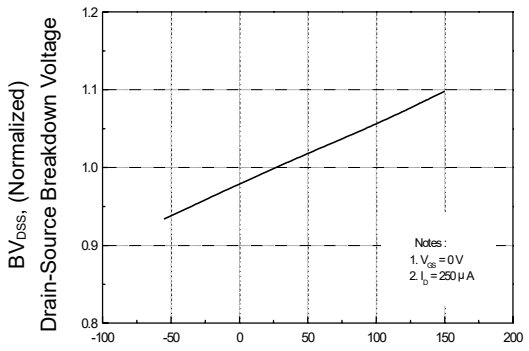


Figure 7: SBreakdown Voltage Variationvs. Temperature

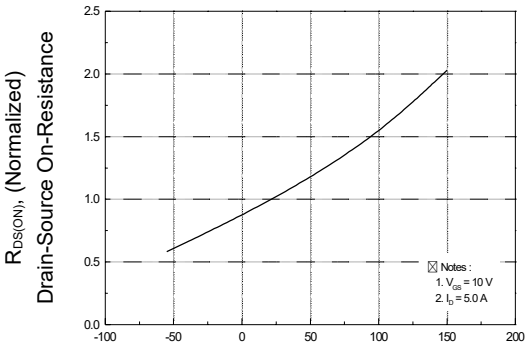


Figure 8: On-Resistance Variationvs.Temperature

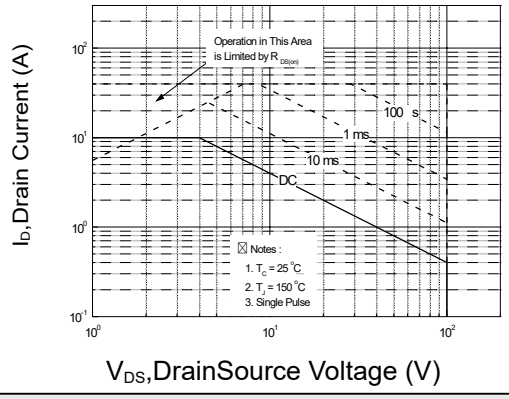


Figure 9: Maximum Safe Operating Area

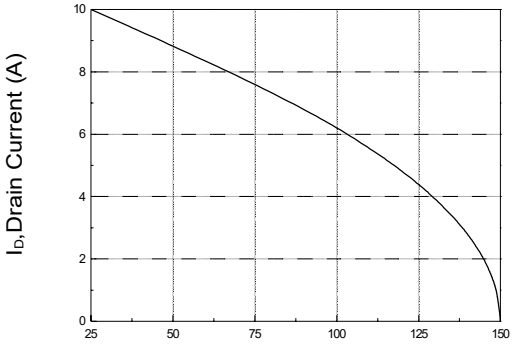


Figure 10: Maximum Drain Currentvs. Case Temperature

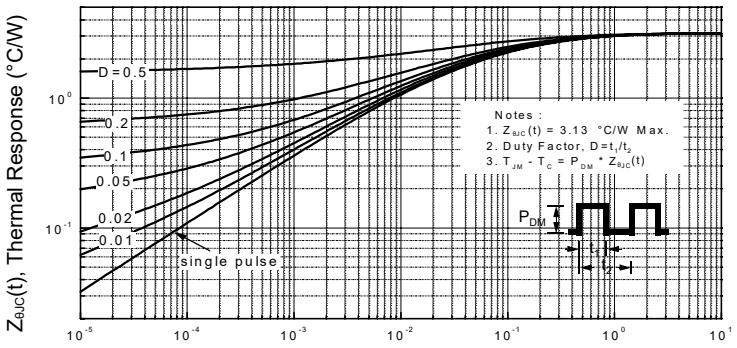


Figure 11: Transient Thermal Response Curve

7.3Typical characteristic

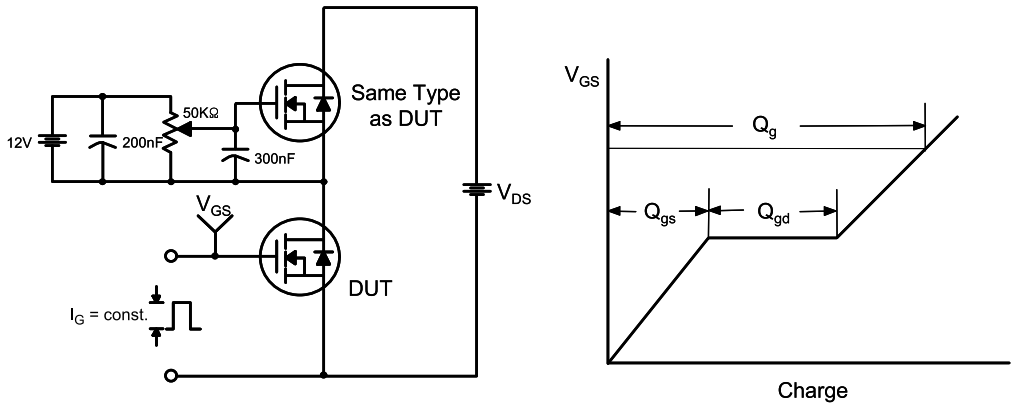


Figure 12. Gate Charge Test Circuit & Waveform

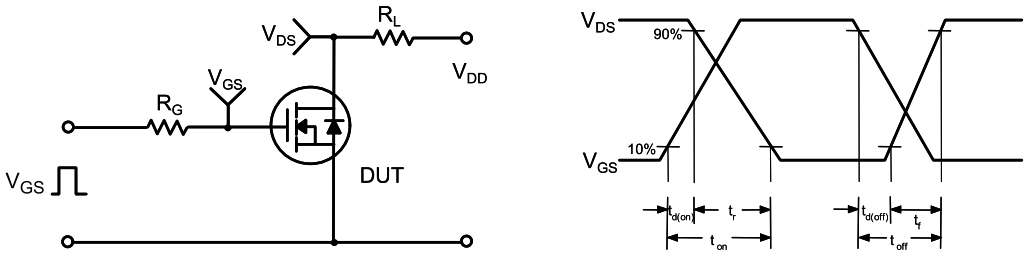


Figure 13. Resistive Switching Test Circuit & Waveforms

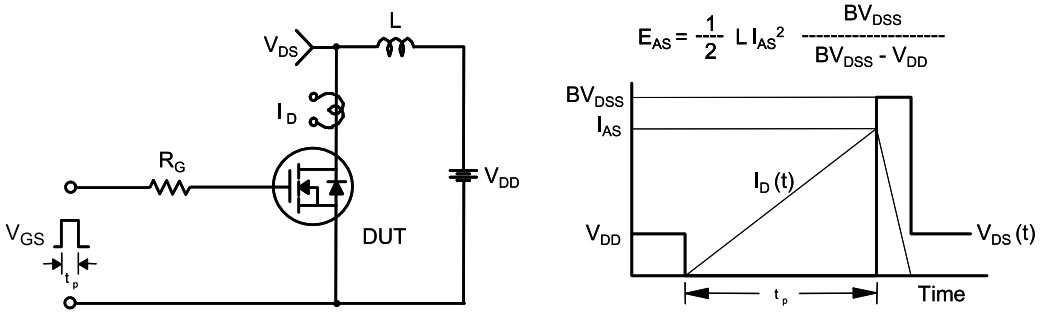


Figure 14. Unclamped Inductive Switching Test Circuit & Waveforms

7.4Typical characteristic

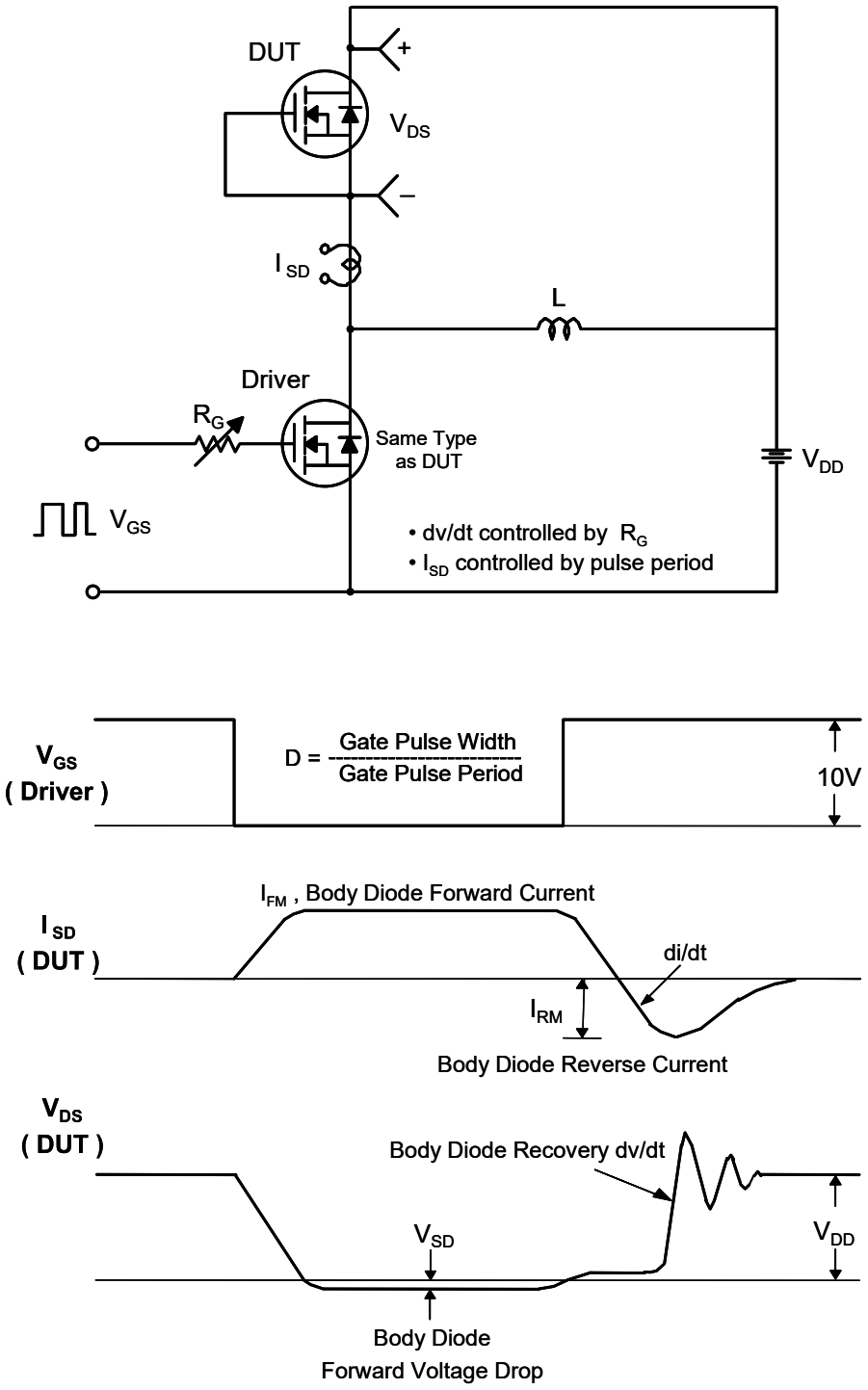
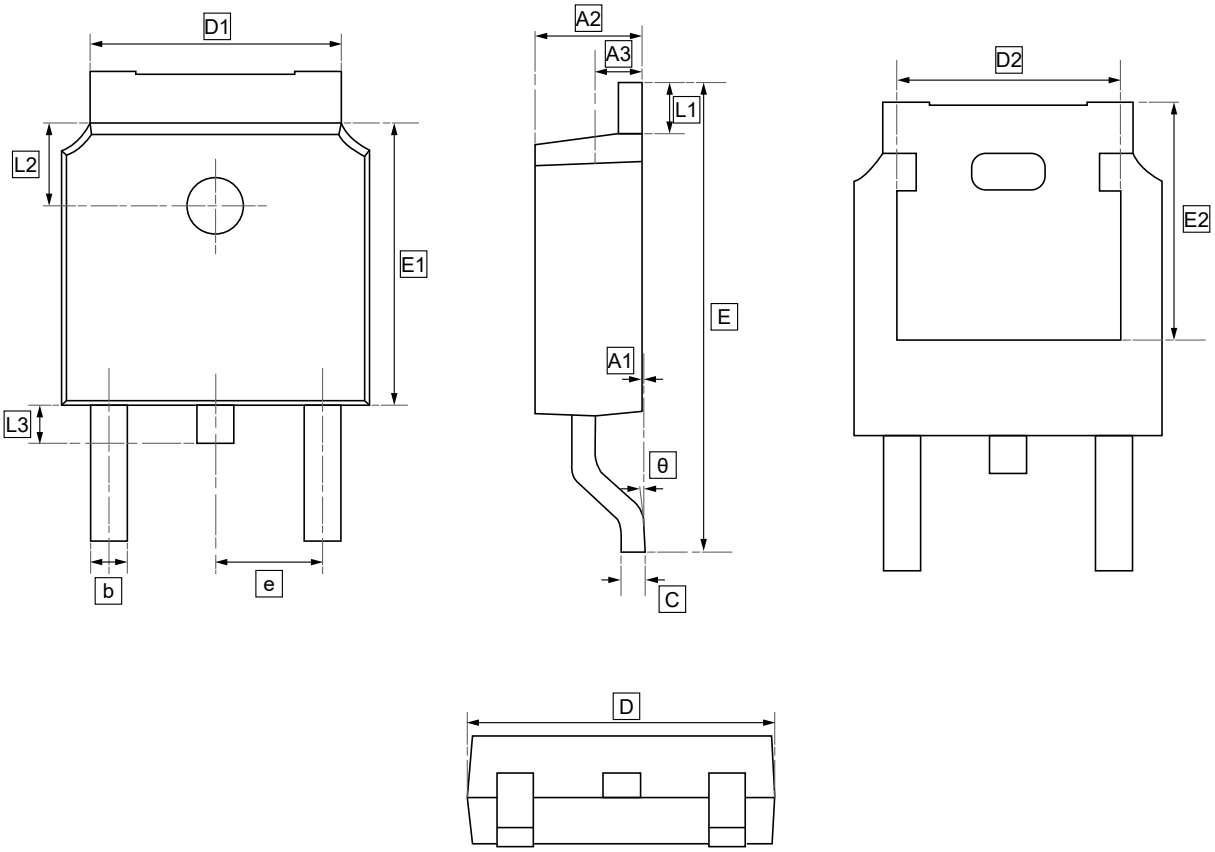


Figure 15. Peak Diode Recovery dv/dt Test Circuit & Waveforms

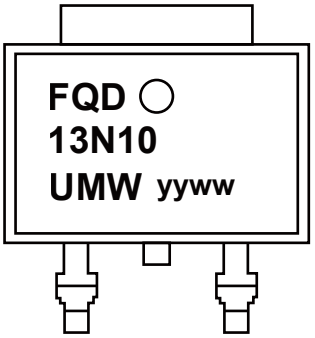
8.TO-252 Package Outline Dimensions



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	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

9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW FQD13N10LTM	TO-252	2500	Tape and reel

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