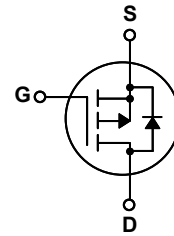


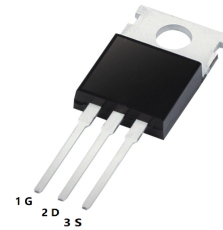
Description

These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.



Features

- V_{DS} (V) = -60V
- I_D = -13.5A (V_{GS} = -10V)
- $R_{DS(ON)}$ < 70m Ω (V_{GS} = -10V)



Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	FQP27P06	Unit
V_{DSS}	Drain-Source Voltage	-60	V
I_D	Drain Current	- Continuous ($T_C = 25^\circ\text{C}$)	-27
		- Continuous ($T_C = 100^\circ\text{C}$)	-19.1
I_{DM}	Drain Current - Pulsed (Note 1)	-108	A
V_{GSS}	Gate-Source Voltage	± 25	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	560	mJ
I_{AR}	Avalanche Current (Note 1)	-27	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	12	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	-7.0	V/ns
P_D	Power Dissipation ($T_C = 25^\circ\text{C}$)	120	W
		- Derate above 25°C	0.8
T_J, T_{STG}	Operating and Storage Temperature Range	-55 to +175	$^\circ\text{C}$
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Thermal Characteristics

Symbol	Parameter	FQP27P06	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case, Max.	1.25	$^\circ\text{C}/\text{W}$
$R_{\theta CS}$	Thermal Resistance, Case-to-Sink, Typ.	0.5	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient, Max.	62.5	$^\circ\text{C}/\text{W}$

Elerical Characteristics

$T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = -250\ \mu\text{A}$	-60			V
$\Delta BV_{DSS} / \Delta T_J$	Breakdown Voltage Temperature Coefficient	$I_D = -250\ \mu\text{A}$, Referenced to 25°C		-0.06		$\text{V}/^\circ\text{C}$
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -48\text{ V}, T_C = 150^\circ\text{C}$			-10	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	$V_{GS} = -25\text{ V}, V_{DS} = 0\text{ V}$			-100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	$V_{GS} = 25\text{ V}, V_{DS} = 0\text{ V}$			100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = -250\ \mu\text{A}$	-1.1	-2	-3.0	V
$R_{DS(on)}$	Static Drain-Source On-Resistance	$V_{GS} = -10\text{ V}, I_D = -13.5\text{ A}$		55	70	m Ω
g_{FS}	Forward Transconductance	$V_{DS} = -30\text{ V}, I_D = -13.5\text{ A}$		12.4		S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1.0\text{ MHz}$		1100	1400	pF
C_{oss}	Output Capacitance			510	660	pF
C_{rss}	Reverse Transfer Capacitance			120	155	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD} = -30\text{ V}, I_D = -13.5\text{ A},$ $R_G = 25\ \Omega$		18	45	ns
t_r	Turn-On Rise Time			185	380	ns
$t_{d(off)}$	Turn-Off Delay Time			30	70	ns
t_f	Turn-Off Fall Time		(Note 4)	90	190	ns
Q_g	Total Gate Charge	$V_{DS} = -48\text{ V}, I_D = -27\text{ A},$ $V_{GS} = -10\text{ V}$		33	43	nC
Q_{gs}	Gate-Source Charge			6.8		nC
Q_{gd}	Gate-Drain Charge		(Note 4)	18		nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current				-27	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current				-108	A
V_{SD}	Drain-Source Diode Forward Voltage	$V_{GS} = 0\text{ V}, I_S = -27\text{ A}$			-4.0	V
t_{rr}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, I_S = -27\text{ A},$		105		ns
Q_{rr}	Reverse Recovery Charge	$dI_F / dt = 100\text{ A}/\mu\text{s}$		0.41		μC

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. $L = 0.9\text{mH}, I_{AS} = -27\text{A}, V_{DD} = -25\text{V}, R_G = 25\ \Omega$, Starting $T_J = 25^\circ\text{C}$
3. $I_{SD} \leq -27\text{A}, di/dt \leq 300\text{A}/\mu\text{s}, V_{DD} \leq BV_{DSS}$, Starting $T_J = 25^\circ\text{C}$
4. Essentially independent of operating temperature

Typical Characteristics

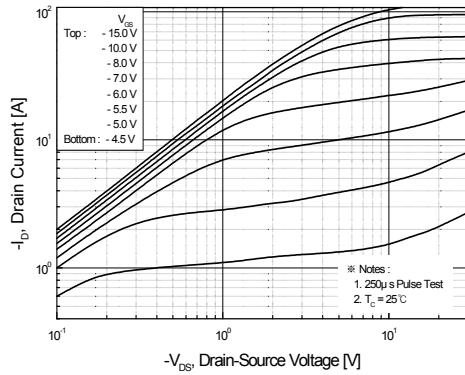


Figure 1. On-Region Characteristics

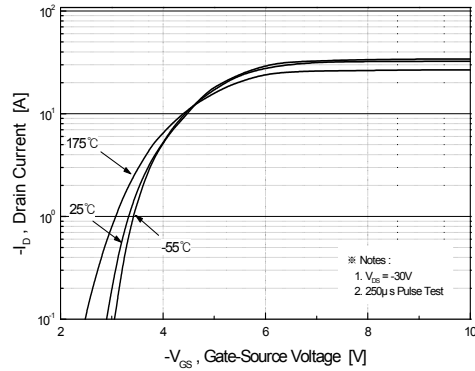


Figure 2. Transfer Characteristics

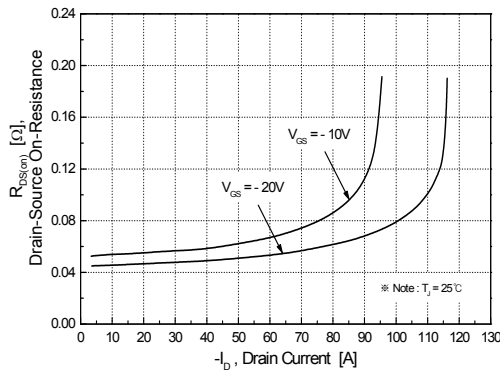


Figure 3. On-Resistance Variation vs. Drain Current and Gate Voltage

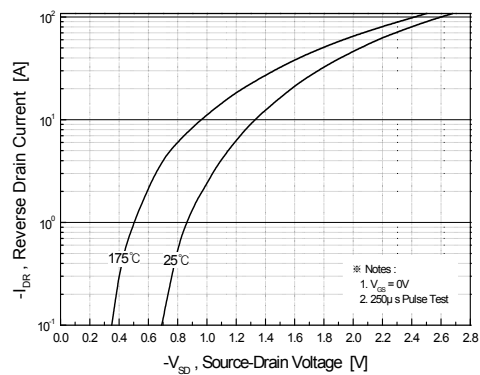


Figure 4. Body Diode Forward Voltage Variation vs. Source Current and Temperature

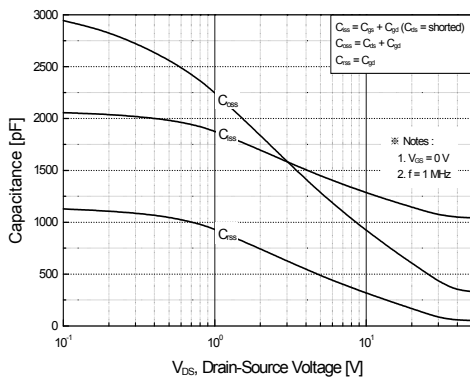


Figure 5. Capacitance Characteristics

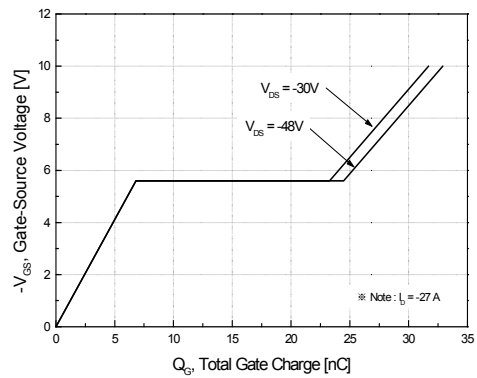


Figure 6. Gate Charge Characteristics

Typical Characteristics

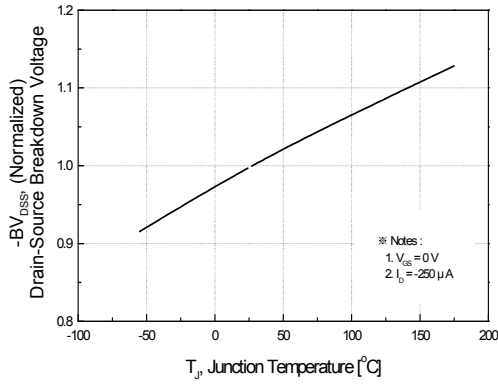


Figure 7. Breakdown Voltage Variation vs. Temperature

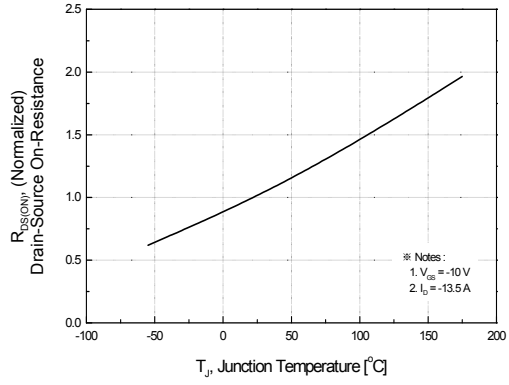


Figure 8. On-Resistance Variation vs. Temperature

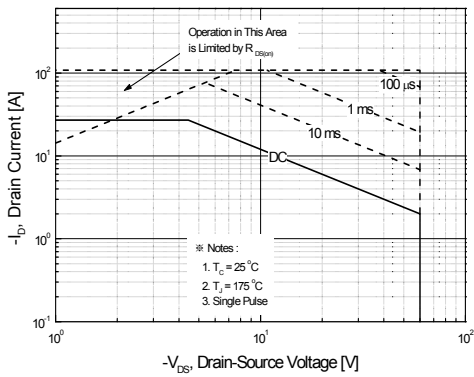


Figure 9. Maximum Safe Operating Area

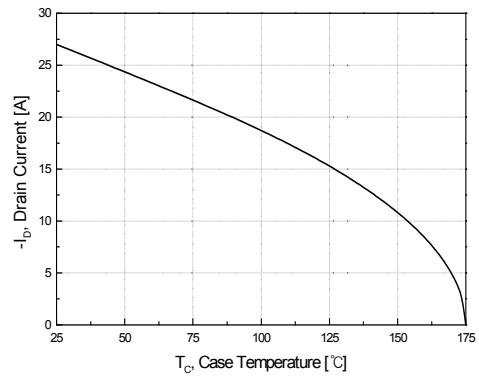


Figure 10. Maximum Drain Current vs. Case Temperature

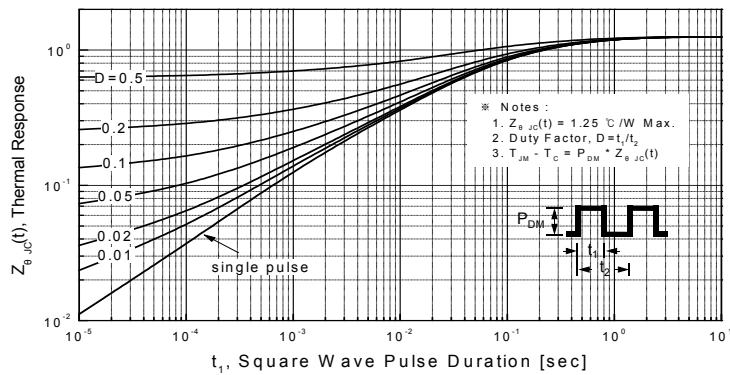
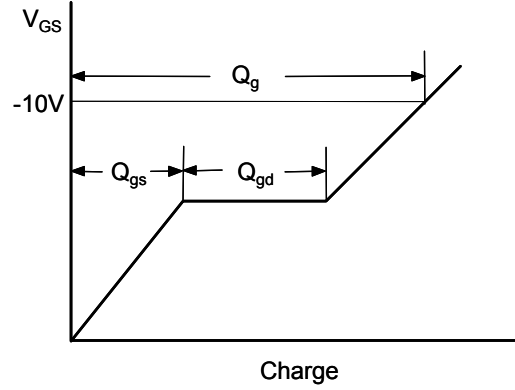
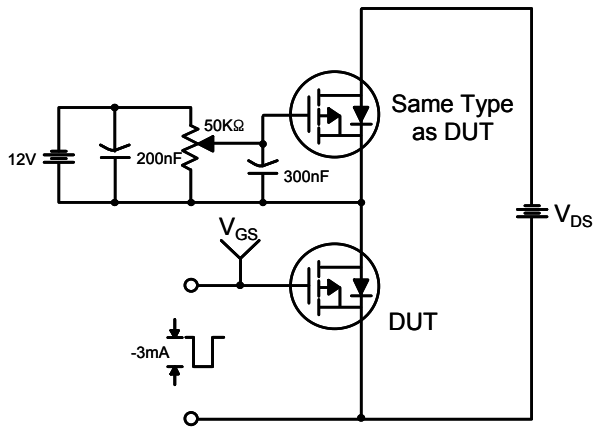
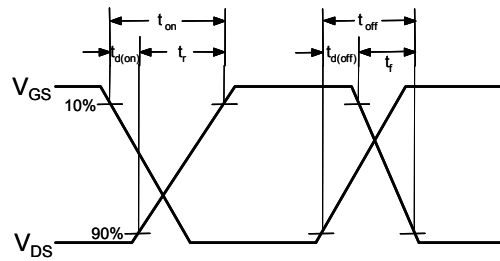
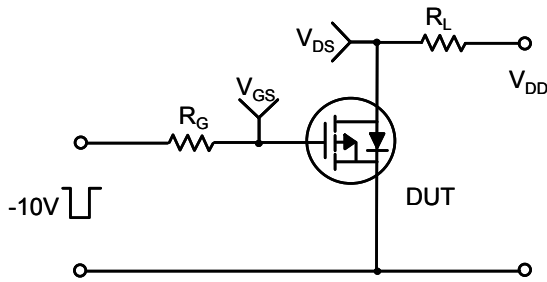


Figure 11. Transient Thermal Response Curve

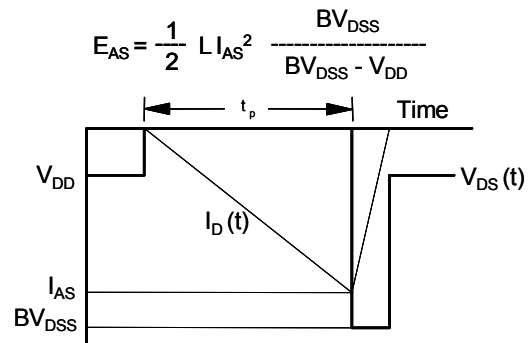
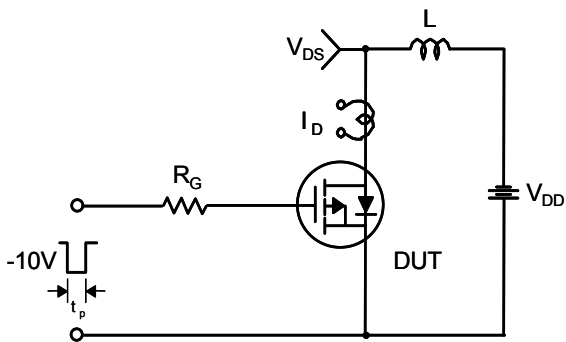
Gate Charge Test Circuit & Waveform



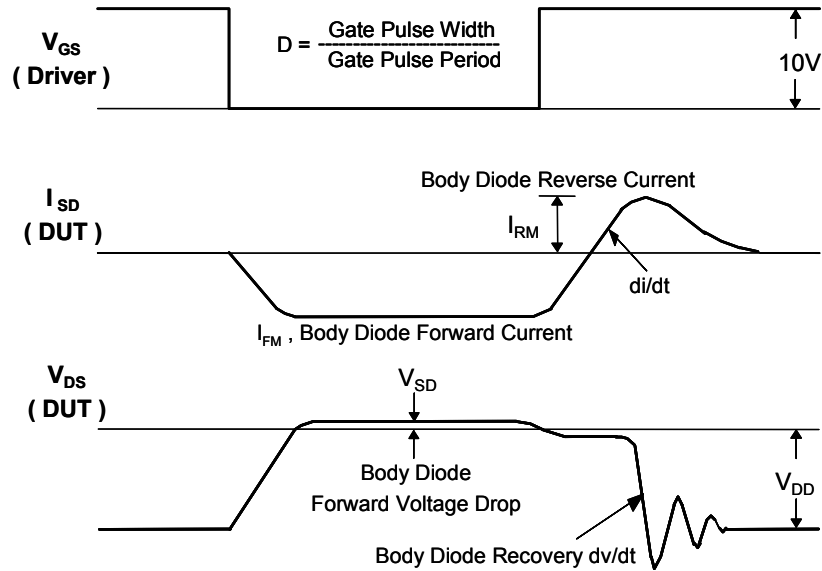
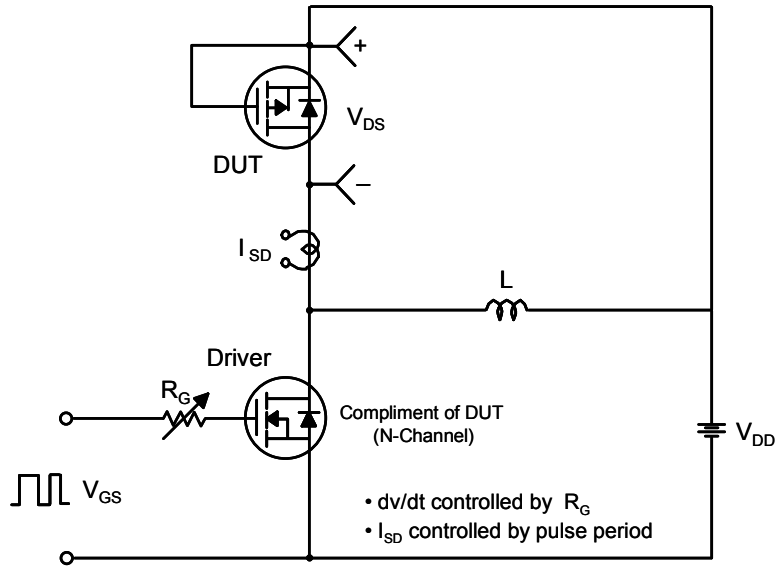
Resistive Switching Test Circuit & Waveforms



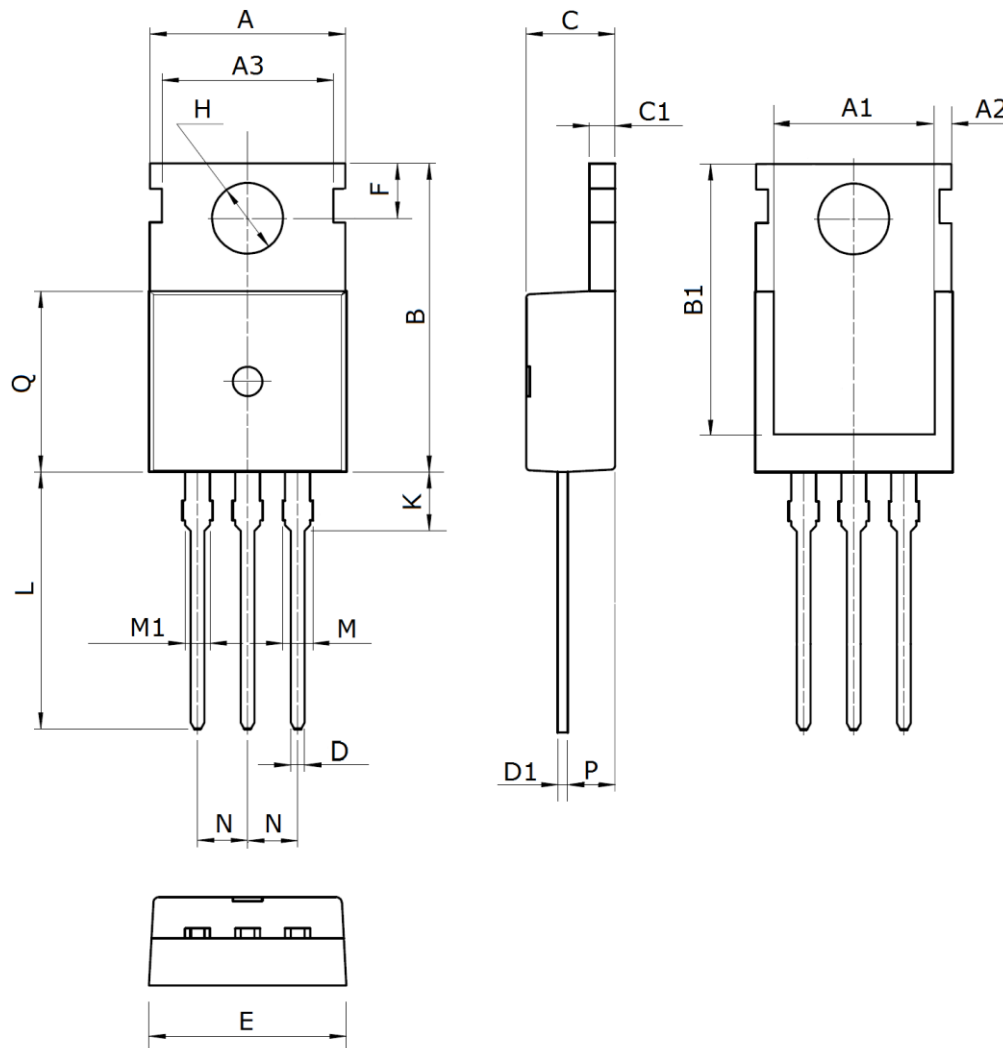
Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Test Circuit & Waveforms

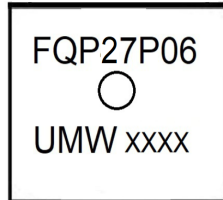


Package Mechanical Data TO-220



Symbol	Dimensions (mm)	Symbol	Dimensions (mm)	Symbol	Dimensions (mm)
A	10.0±0.3	C1	1.3±0.2	L	13.2±0.4
A1	8.0±0.2	D	0.8±0.2	M	1.38±0.1
A2	0.94±0.1	D1	0.5±0.1	M1	1.28±0.1
A3	8.7±0.1	E	10.0±0.3	N	2.54(typ)
B	15.6±0.4	F	2.8 ±0.1	P	2.4±0.3
B1	13.2±0.2	H	3.6±0.1	Q	9.15±0.25
C	4.5±0.2	K	3.1±0.2		

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW FQP27P06	TO-220	1000	Tape and reel