

1.Description

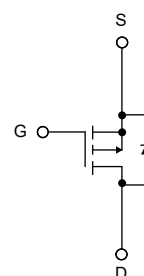
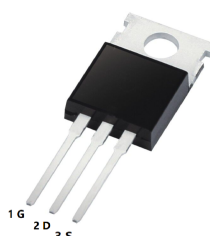
These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

2.Features

- $V_{DS(V)} = -60V$
- $I_D = -27A$
- $R_{DS(ON)} < 70m\Omega (V_{GS} = -10V)$

3.Pinning information

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



4.Absolute Maximum Ratings $T_c = 25^\circ C$

Parameter		Symbol	Rating	Units
Drain Source Voltage		V_{DSS}	-60	V
Drain Current - Continuous	$T_c = 25^\circ C$	I_D	-27	A
	$T_c = 100^\circ C$		-19.1	A
- Pulsed (Note 1)		I_{DM}	-108	A
Gate-Source Voltage		V_{GSS}	± 25	V
Single Pulsed Avalanche Energy (Note 2)		E_{AS}	560	mJ
Avalanche Current (Note 1)		I_{AR}	-27	A
Repetitive Avalanche Energy (Note 1)		E_{AR}	12	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	-7	V/ns
Power Dissipation	$T_c = 25^\circ C$	P_D	120	W
	- Derate above $25^\circ C$		0.8	W/ $^\circ C$
Temperature Range		T_J, T_{STG}	-55 to 175	$^\circ C$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds		T_L	300	$^\circ C$



5. Thermal Characteristics

Parameter	Symbol	Rating	Units
Thermal Resistance, Junction-to-Case, Max.	$R_{\theta JC}$	1.25	°C/W
Thermal Resistance, Case-to-Sink, Typ.	$R_{\theta CS}$	0.5	°C/W
Thermal Resistance, Junction-to-Ambient, Max.	$R_{\theta JA}$	62.5	°C/W



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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain to Source Breakdown Voltage	BV _{DSS}	I _D =-250μA, V _{GS} =0V	-60			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I _D =-250μA Referenced to 25°C		-0.06		V/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-60V, V _{GS} =0V			-1	μA
		V _{DS} =-48V, T _C =150°C			-10	μA
Gate-Body Leakage Current, Forward	I _{GSSF}	V _{GS} =-25V, V _{DS} =0V			-100	nA
Gate-Body Leakage Current, Reverse	I _{GSSR}	V _{GS} =25V, V _{DS} =0V			100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-2		-4	V
Static Drain to Source On Resistance	R _{DS(ON)}	V _{GS} =-10V, I _D =-13.5A		55	70	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-30V, I _D =-13.5A		12.4		S
Input Capacitance	C _{iss}	V _{DS} =-25V, V _{GS} =0V, f=1MHz		1100	1400	pF
Output Capacitance	C _{oss}			510	660	pF
Reverse Transfer Capacitance	C _{rss}			120	155	pF
Turn-On Delay Time	t _{D(on)}	V _{DD} =-30V, I _D =-13.5A R _G =25Ω (Note 4)		18	45	ns
Rise Time	t _r			185	380	ns
Turn-Off Delay Time	t _{D(off)}			30	70	ns
Fall Time	t _f			90	190	ns
Total Gate Charge	Q _g	V _{DS} =-48V, I _D =-27A V _{GS} =-10V (Note 4)		33	43	nC
Gate-Source Charge	Q _{gs}			6.8		nC
Gate-Drain Charge	Q _{gd}			18		nC
Maximum Continuous Drain to Source Diode Forward Current	I _S				-27	A
Maximum Pulsed Drain to Source Diode Forward Current	I _{SM}				-108	A



Drain-Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-27A$			-4	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_S=-27A$		105		ns
Reverse Recovery Charge	Q_{rr}	$dI_F/dt=100A/\mu s$		0.41		μC

Notes:

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



7.1 Typical characteristic

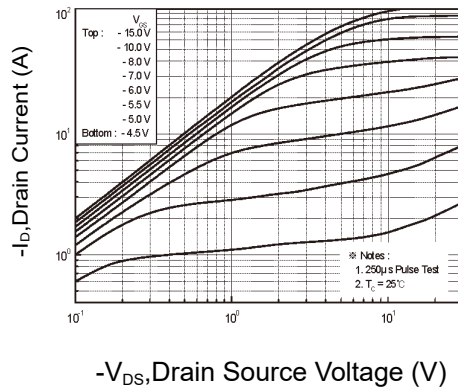


Figure 1: Output Characteristics

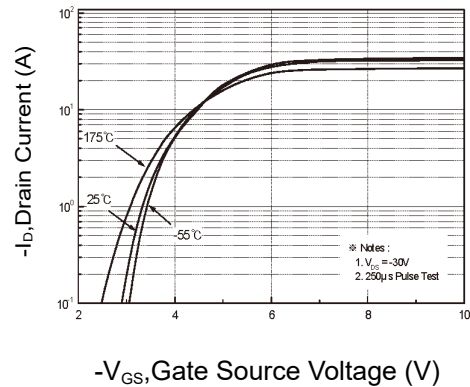


Figure 2: Transfer Characteristics

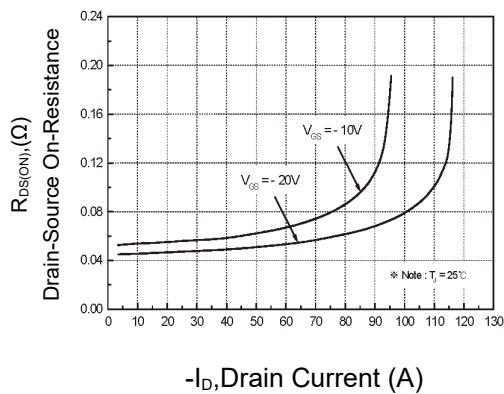


Figure 3: On-Resistance Variation vs. Drain Current and Gate Voltage

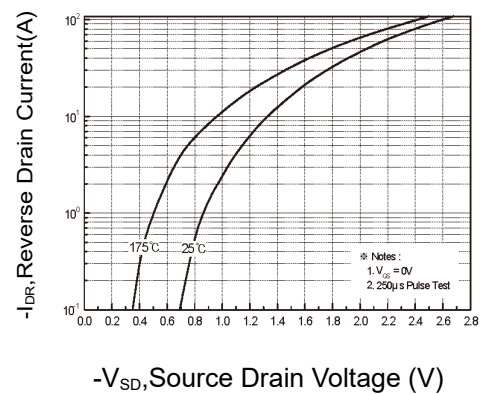


Figure 4: Body Diode Forward Voltage Variation vs. Source Current and Temperature

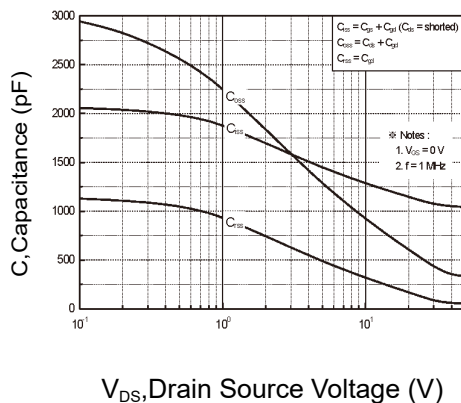


Figure 5: Capacitance Characteristics

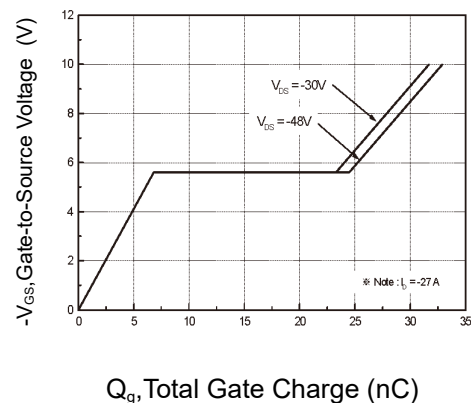


Figure 6: Gate Charge Characteristics



7.2 Typical characteristic

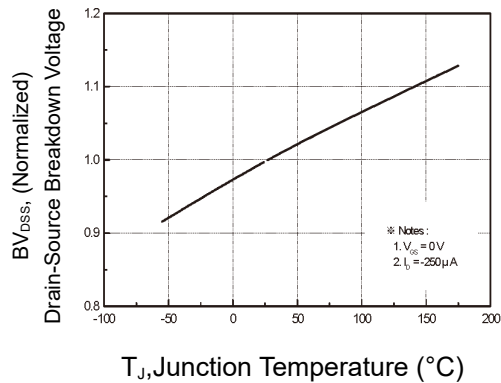


Figure 7: Breakdown Voltage Variation vs. Temperature

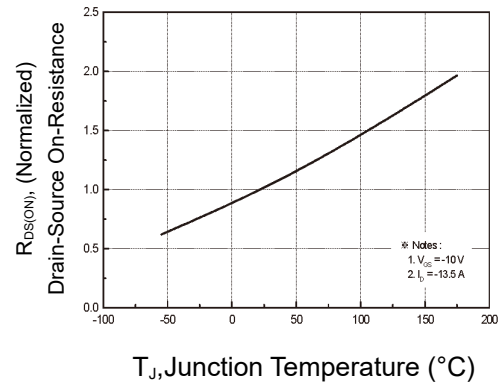


Figure 8: On-Resistance Variation vs. Temperature

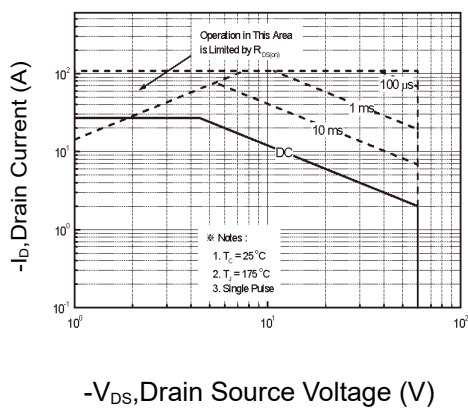


Figure 9: Maximum Drain Current vs. Ambient Temperature

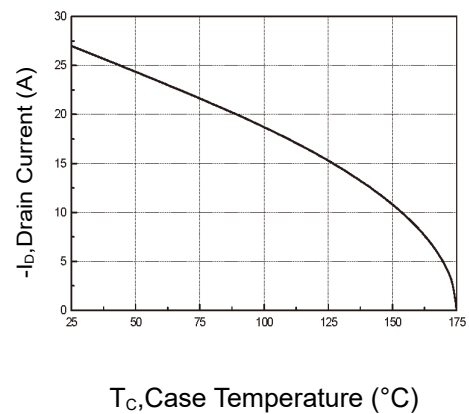


Figure 10: Maximum Drain Current vs. Case Temperature

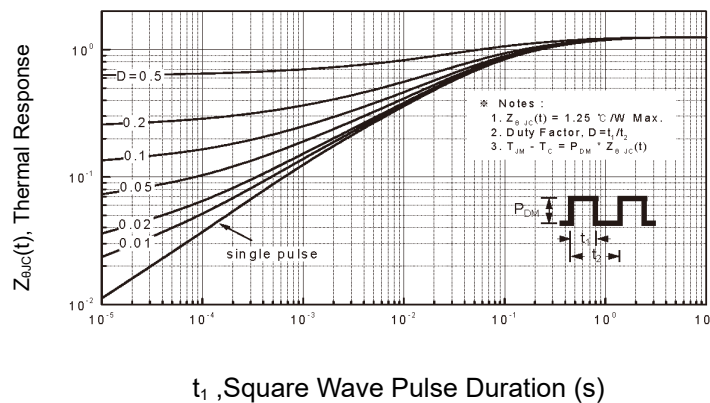


Figure 11: Transient Thermal Response Curve



7.3 Typical characteristic

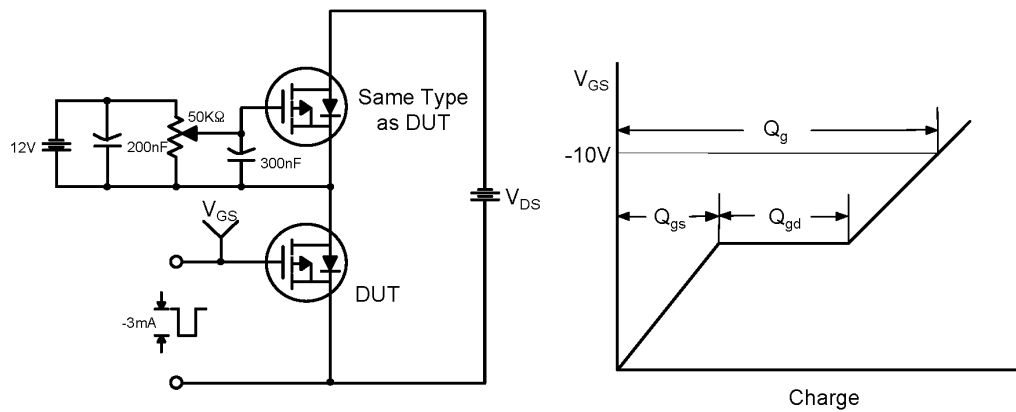


Figure 12: Gate Charge Test Circuit & Waveform

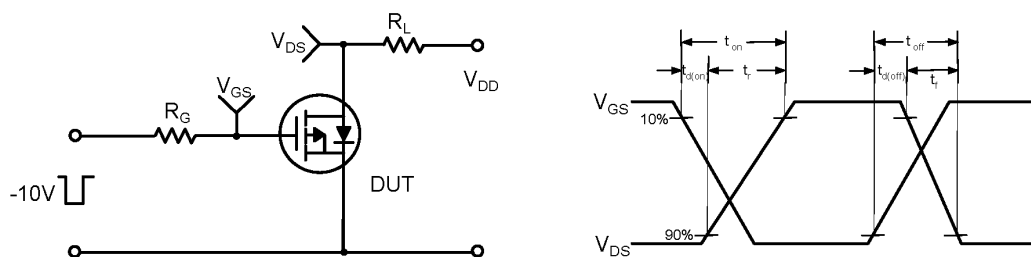


Figure 13: Resistive Switching Test Circuit & Waveforms

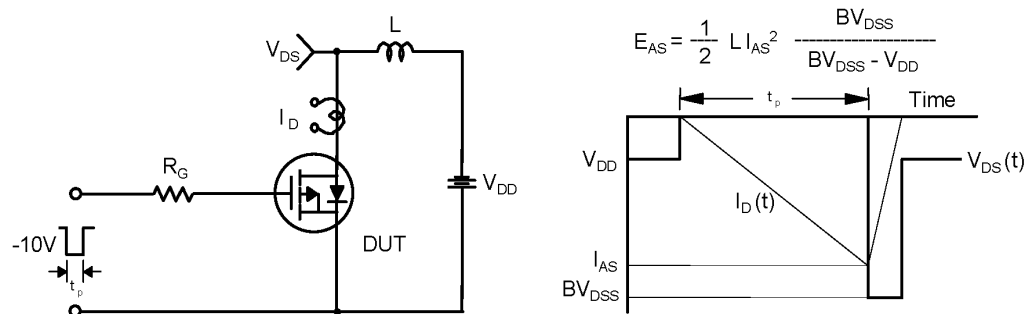


Figure 14: Unclamped Inductive Switching Test Circuit & Waveforms



7.4 Typical characteristic

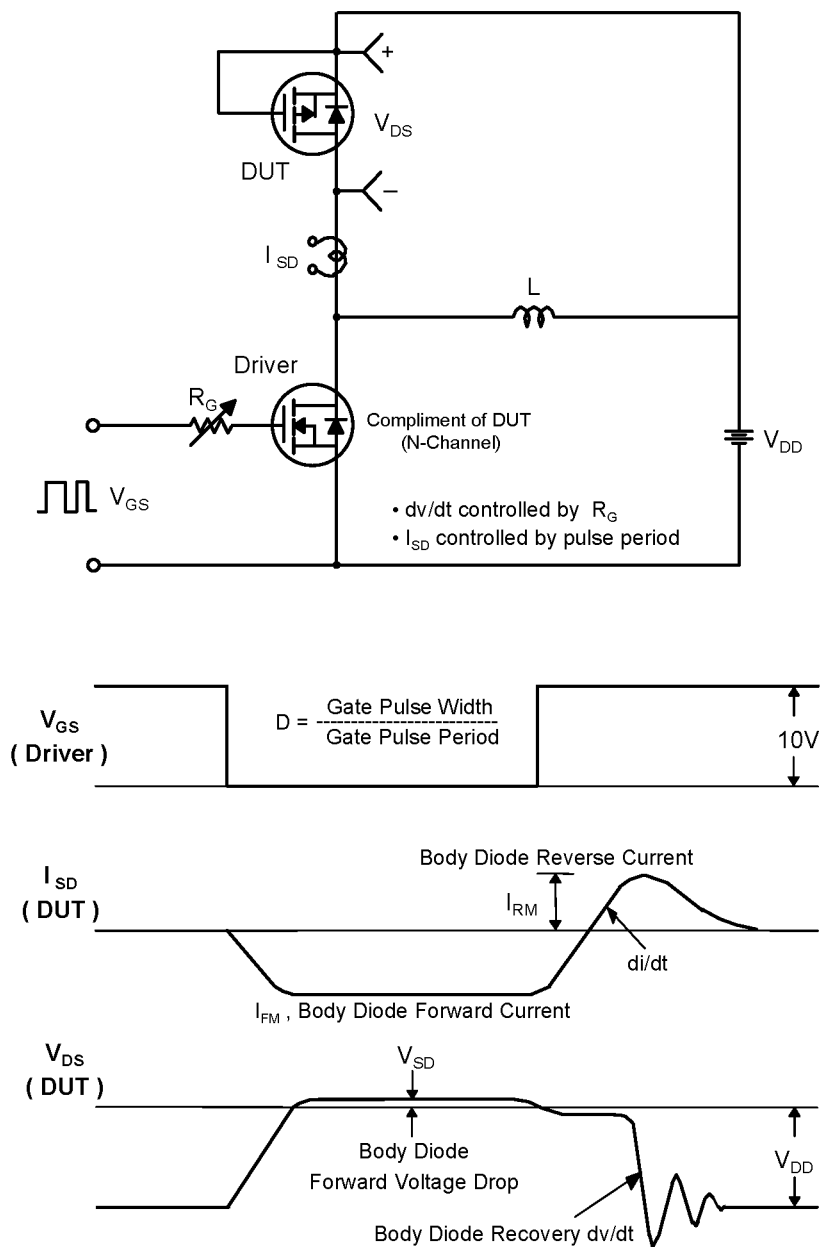
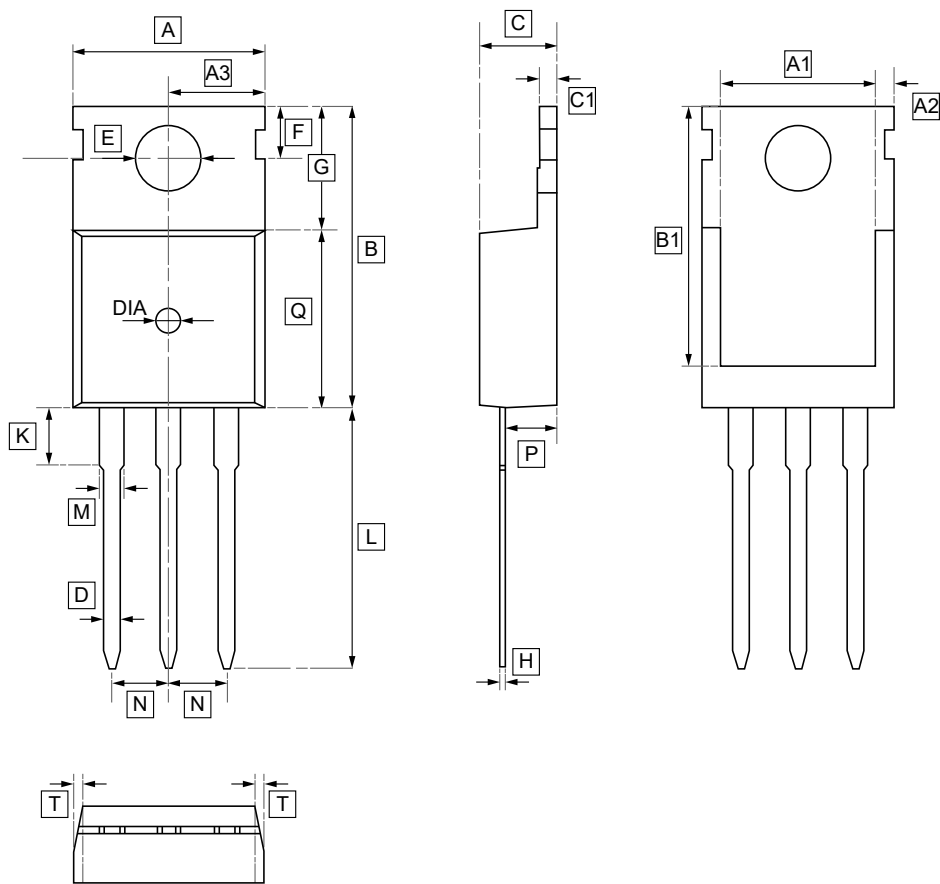


Figure 15: Peak Diode Recovery dv/dt Test Circuit & Waveforms



8.1 TO-220 Package Outline Dimensions



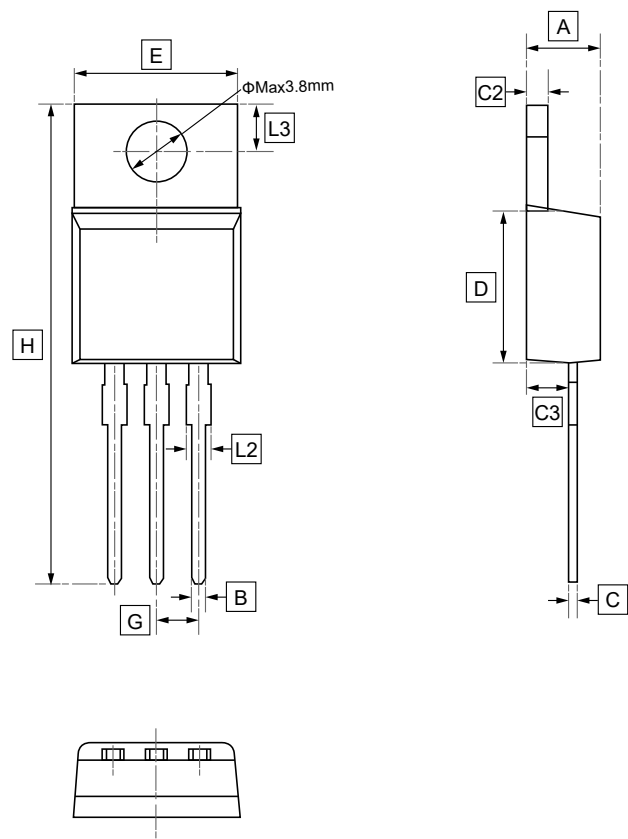
DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	A3	B	B1	C	C1	D	E	F	G
Min	9.7	8.44	1.05	4.8	15.4	12.9	4.28	1.1	0.6	3.4	2.65	5.2
Max	10.3	8.84	1.25	5.2	16.2	13.5	4.68	1.5	1.0	3.8	3.25	5.8

Symbol	H	K	L	L1	M	N	P	Q	T	DIA
Min	0.4	2.9	12.8	2.7	1.15	2.49	2.1	8.7	W:0.35	⌀1.5
Max	0.6	3.3	13.6	3.3	1.35	2.59	2.7	9.3		(deep 0.2)



8.2 TO-220 Package Outline Dimensions

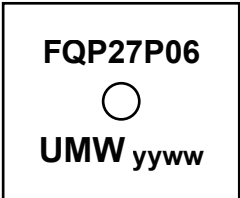


DIMENSIONS (mm are the original dimensions)

Symbol	A	B	C	C2	C3	D	E	G	H	L2	L3
Min	4.30	0.60	0.28	1.17	2.30	8.80	9.80	2.44	28.55	1.10	2.59
Max	4.70	1.00	0.48	1.37	2.70	9.20	10.20	2.64	29.15	1.50	2.89



9.Ordering Information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW FQP27P06	TO-220	1000	Tube and box



10.Disclaimer

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