

1.Description

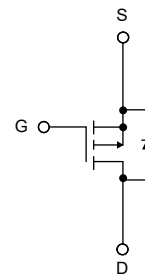
These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

2.Features

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

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

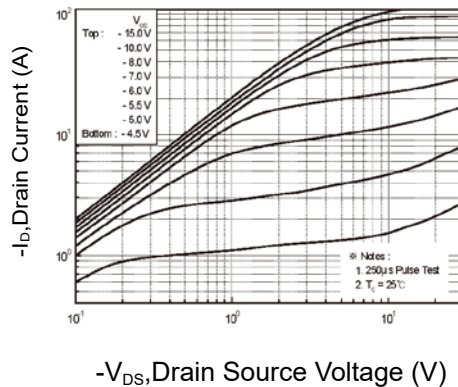


Figure 1: Output Characteristics

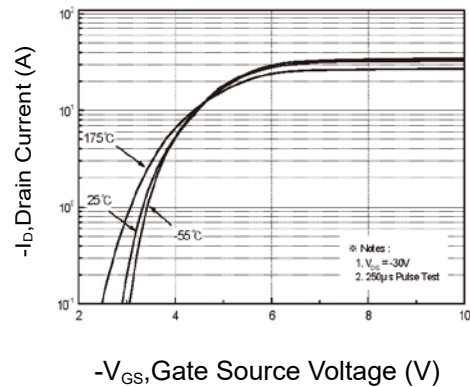


Figure 2: Transfer Characteristics

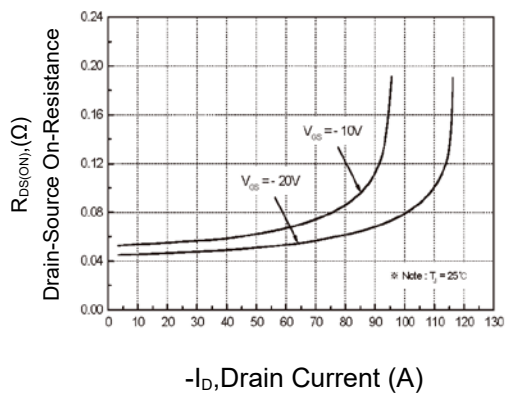


Figure 3: On-Resistance Variation vs. Drain Current and Gate Voltage

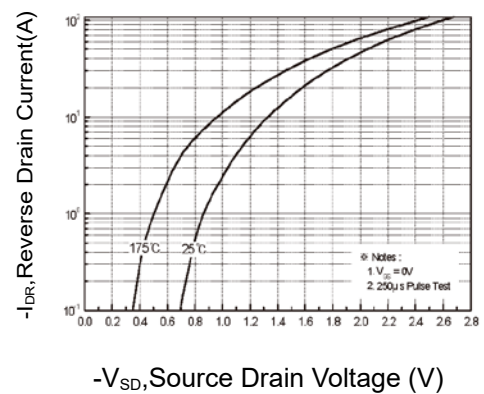


Figure 4: Body Diode Forward Voltage Variation vs. Source Current and Temperature

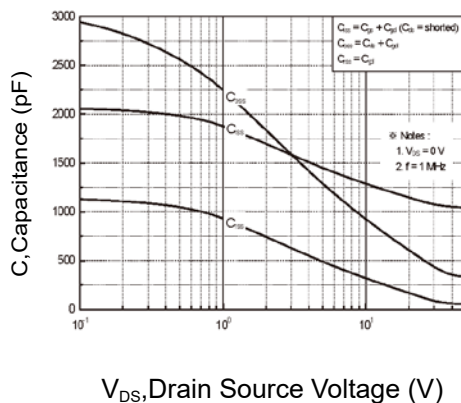


Figure 5: . Capacitance Characteristics

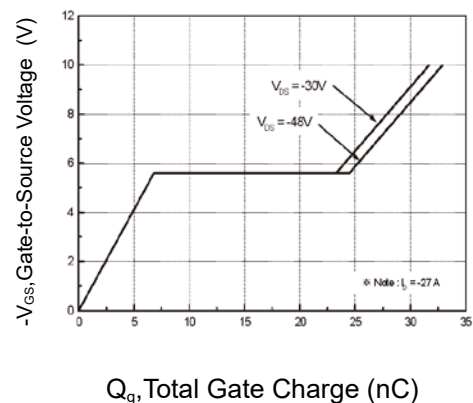


Figure 6: Gate Charge Characteristics



7.2 Typical characteristic

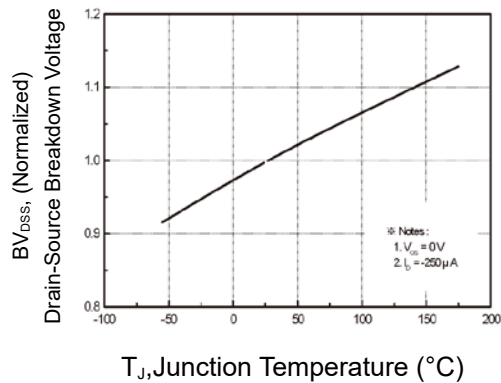


Figure 7: Breakdown Voltage Variation vs. Temperature

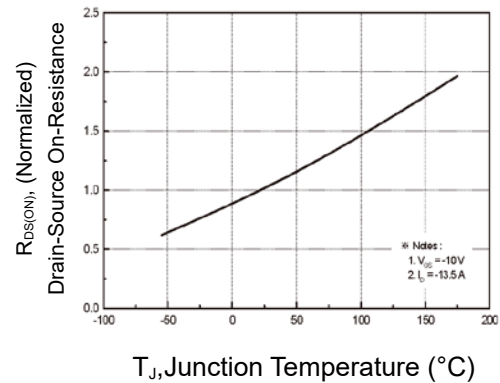


Figure 8: On-Resistance Variation vs. Temperature

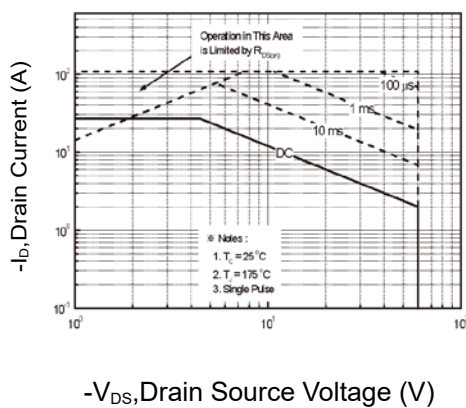


Figure 9: Maximum Drain Current vs. Ambient Temperature

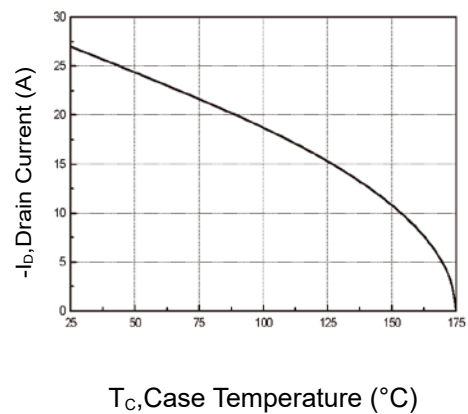


Figure 10: Maximum Drain Current vs. Case Temperature

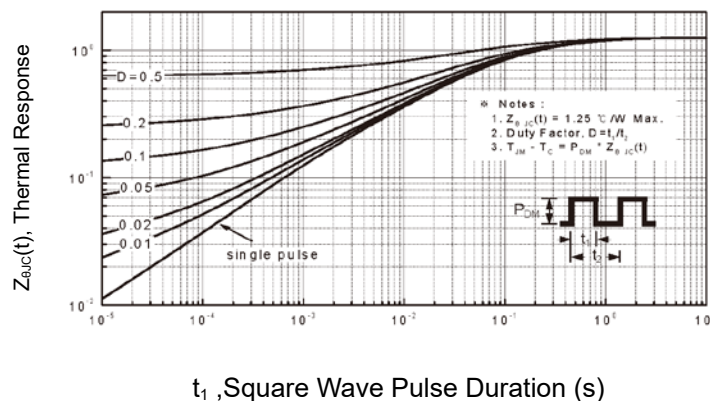


Figure 11: Transient Thermal Response Curve



7.3 Typical characteristic

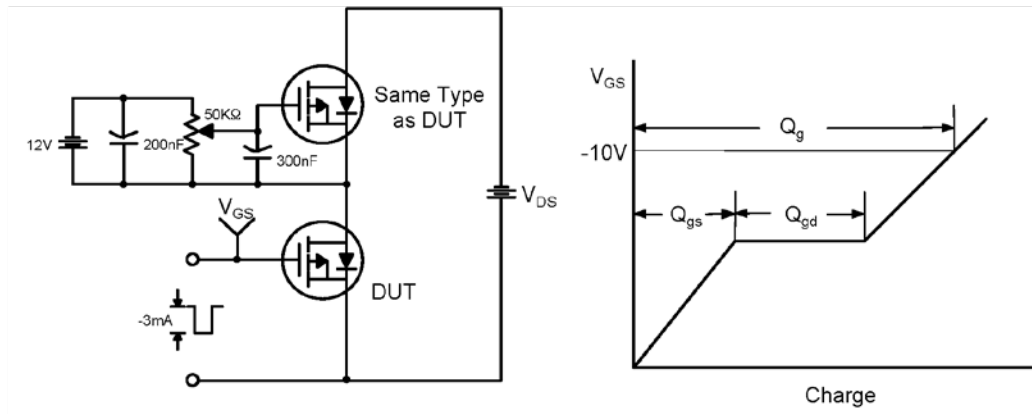


Figure 12: Gate Charge Test Circuit & Waveform

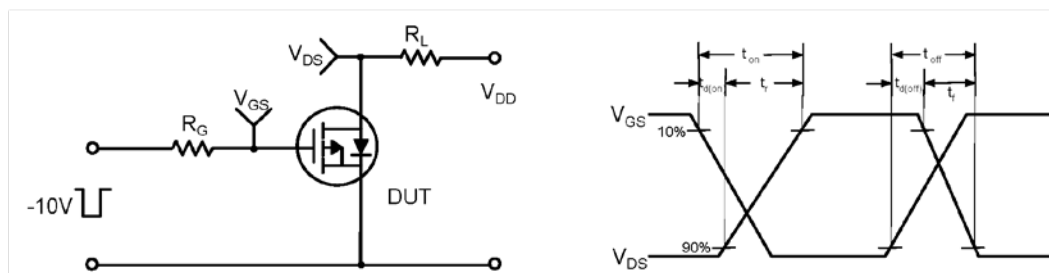


Figure 13: Resistive Switching Test Circuit & Waveforms

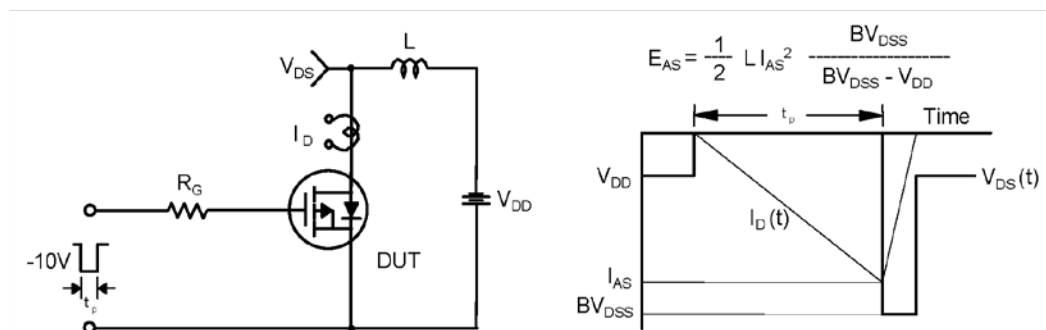


Figure 14: Unclamped Inductive Switching Test Circuit & Waveforms



7.4 Typical characteristic

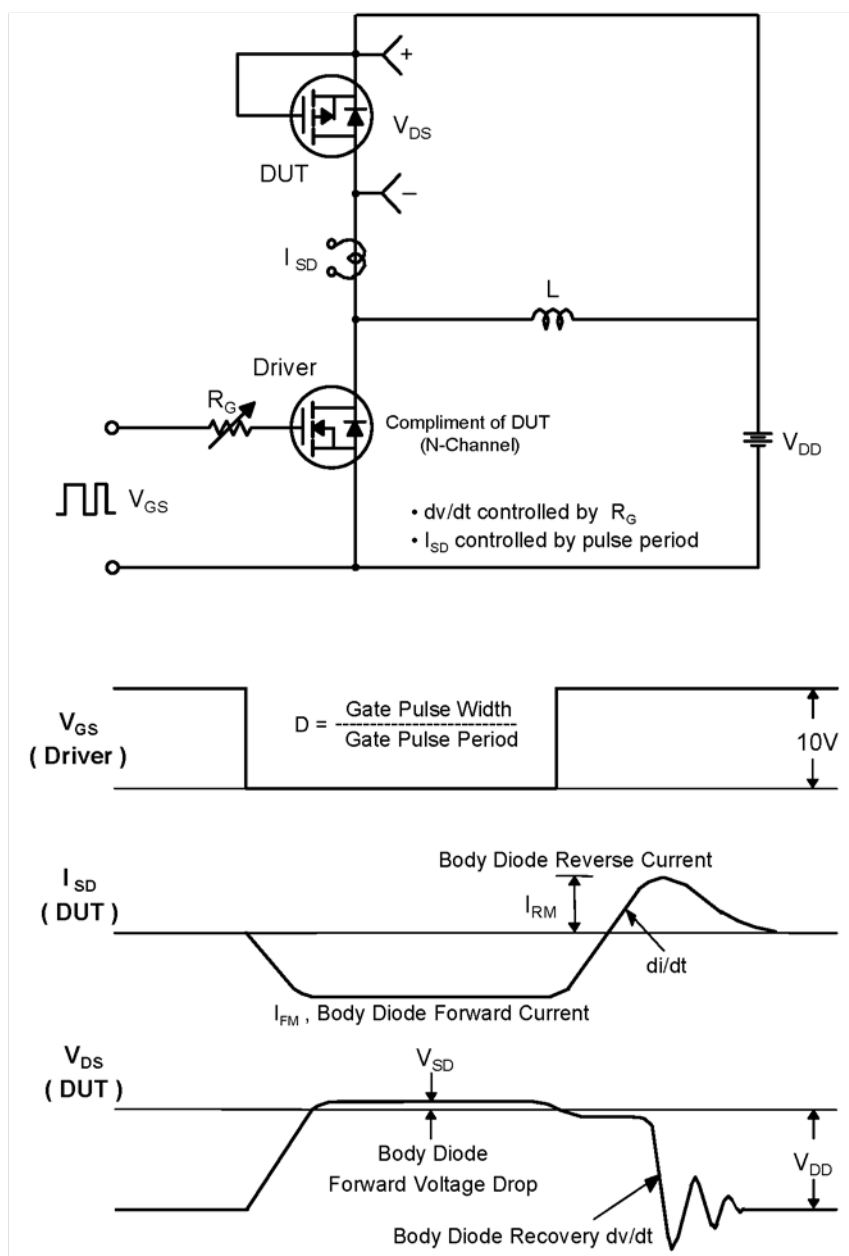
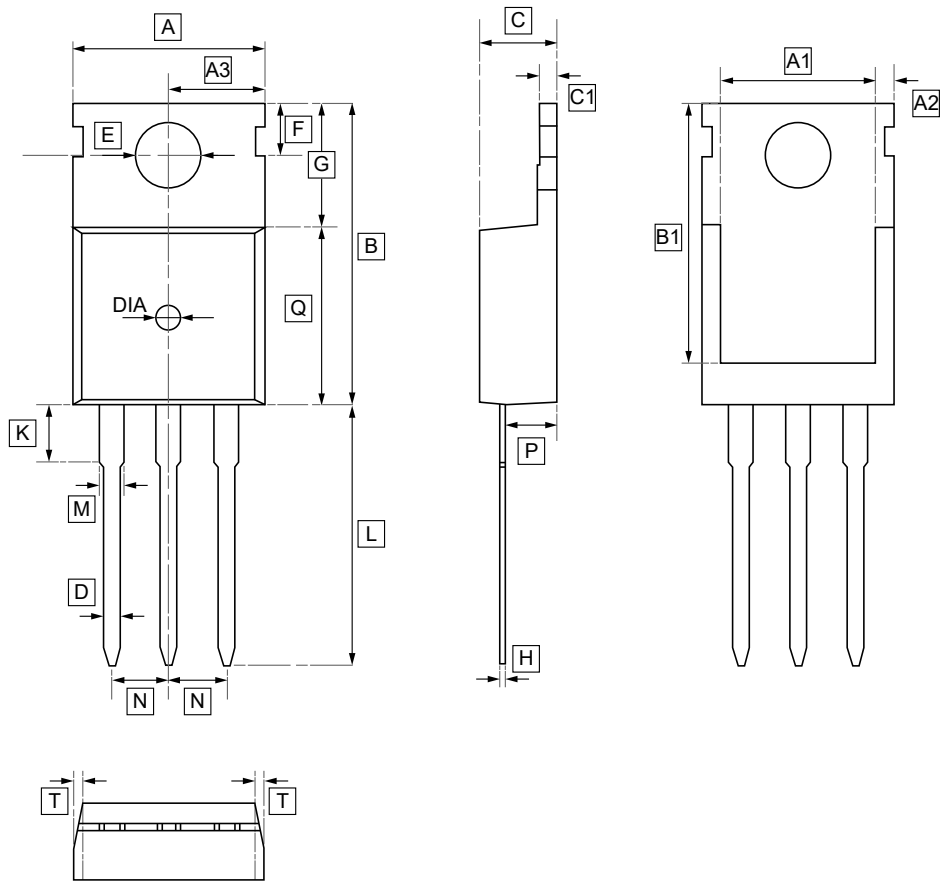


Figure 15: Peak Diode Recovery dv/dt Test Circuit & Waveforms



8.TO-220 Package Outline Dimensions



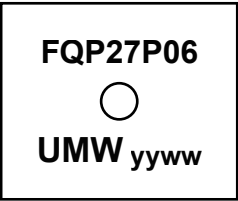
DIMENSIONS (mm are the original dimensions)

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)



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

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.

When applying our products, please do not exceed the maximum rated values, as this may affect the reliability of the entire system. Under certain conditions, any semiconductor product may experience faults or failures. Buyers are responsible for adhering to safety standards and implementing safety measures during system design, prototyping, and manufacturing when using our products to prevent potential failure risks that could lead to personal injury or property damage.

Unless explicitly stated in writing, UMW products are not intended for use in medical, life-saving, or life-sustaining applications, nor for any other applications where product failure could result in personal injury or death. If customers use or sell the product for such applications without explicit authorization, they assume all associated risks.

When reselling, applying, or exporting, please comply with export control laws and regulations of China, the United States, the United Kingdom, the European Union, and other relevant countries, regions, and international organizations.

This document and any actions by UMW do not grant any intellectual property rights, whether express or implied, by estoppel or otherwise. The product names and marks mentioned herein may be trademarks of their respective owners.