UMW FQP27P06

-60V P-Channel MOSFET

1.Description

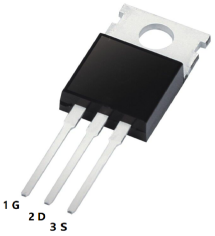
These devices are suitable for switched mode power supplies, audio amplifier, DC motor control, and variable switching power applications.

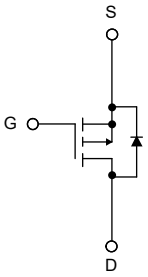
2.Features

- $V_{DS\ (V)}$=-60V
- I_D=-27A
- $R_{DS(ON)}$<70mΩ(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°C

Parameter			Symbol	Rating	Units
Drain Source Voltage			V_{DSS}	-60	V
Drain Current - Continuous	T_C=25°C		I_D	-27	A
- Continuous	T_C=100°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°C		P_D	120	W
- Derate above 25°C				0.8	W/°C
Temperature Range			T_J, T_{STG}	-55 to 175	°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.	$R_{\theta JC}$	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)

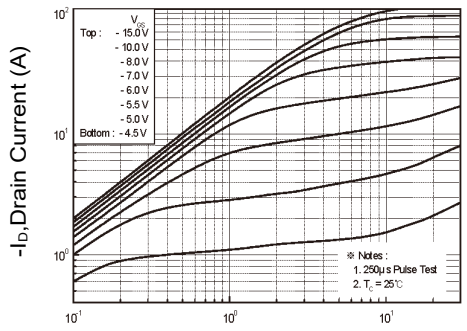
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain to Source Breakdown Voltage	BV_{DSS}	I_D=-250μA, V_{GS}=0V	-60			V
Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{DSS}}{\Delta T_J}$	I_D=-250μA Referenced to 25°C		-0.06		V/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-60V, V_{GS}=0V			-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/μs		0.41		μC

Notes:

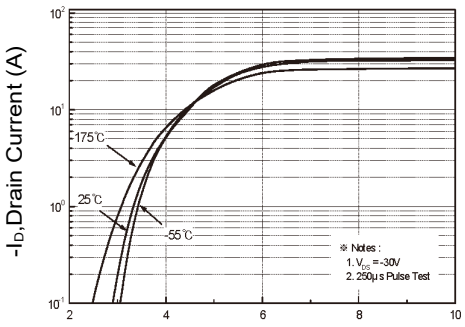
1. Repetitive Rating : Pulse width limited by maximum junction temperature.
2. L=0.9mH, I_{AS}=-27A, V_{DD}=-25V, R_G=25Ω,Starting T_J=25°C.
3. I_{SD} ≤ -27A, di/dt ≤ 300A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J= 25°C.
4. Essentially independent of operating temperature.

7.1Typical characteristic



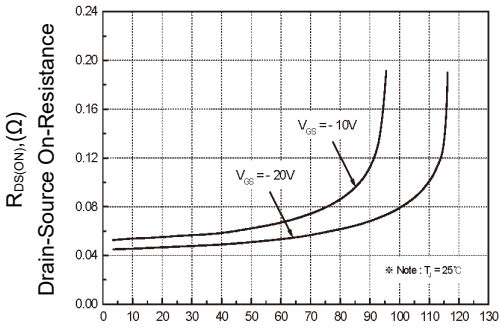
-V_{DS},Drain Source Voltage (V)

Figure 1: Output Characteristics



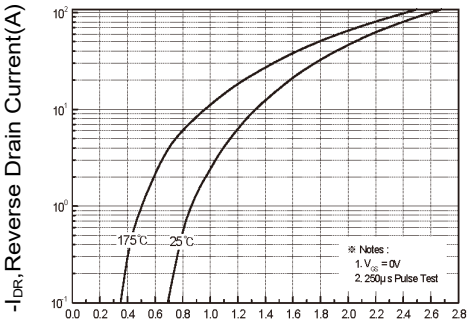
-V_{GS},Gate Source Voltage (V)

Figure 2: Transfer Characteristics



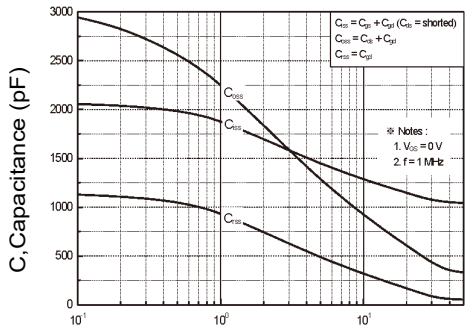
-I_D,Drain Current (A)

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



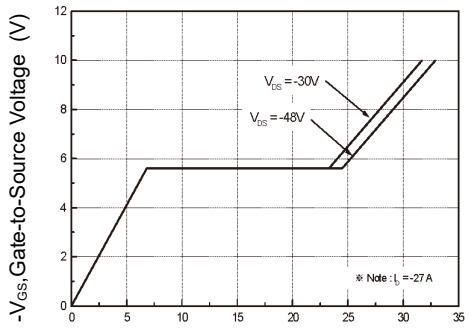
-V_{SD},Source Drain Voltage (V)

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



V_{DS},Drain Source Voltage (V)

Figure 5: . Capacitance Characteristics



Q_g,Total Gate Charge (nC)

Figure 6: Gate Charge Characteristics

7.2Typical characteristic

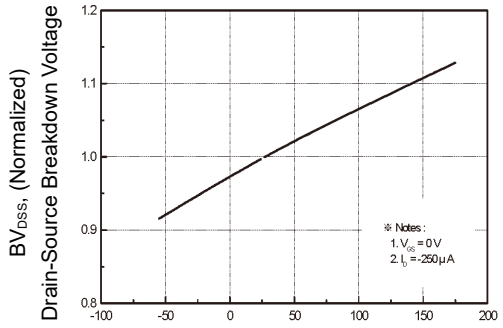


Figure 7: Breakdown Voltage Variation vs. Temperature

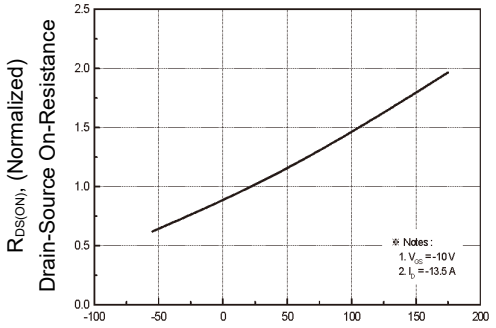


Figure 8: On-Resistance Variation vs. Temperature

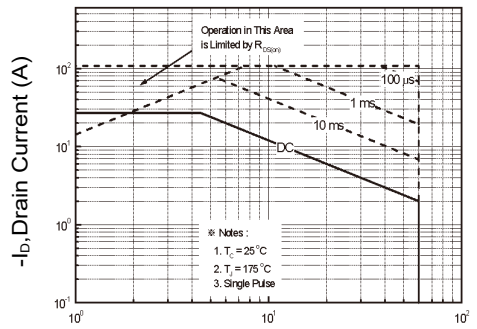


Figure 9: Maximum Drain Current vs. Ambient Temperature

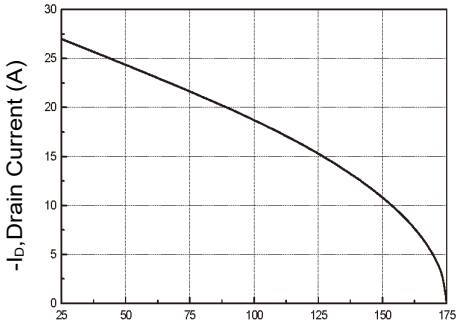


Figure 10: Maximum Drain Current vs. Case Temperature

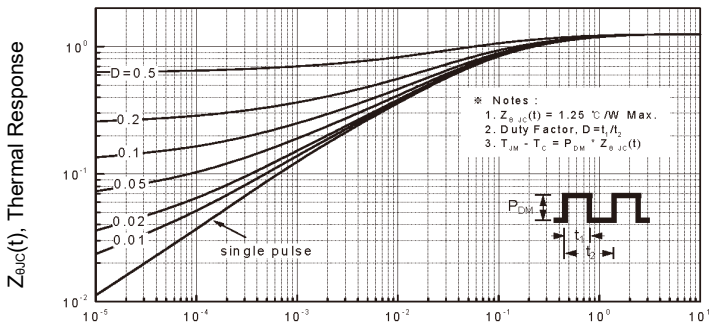


Figure 11: Transient Thermal Response Curve

7.3Typical characteristic

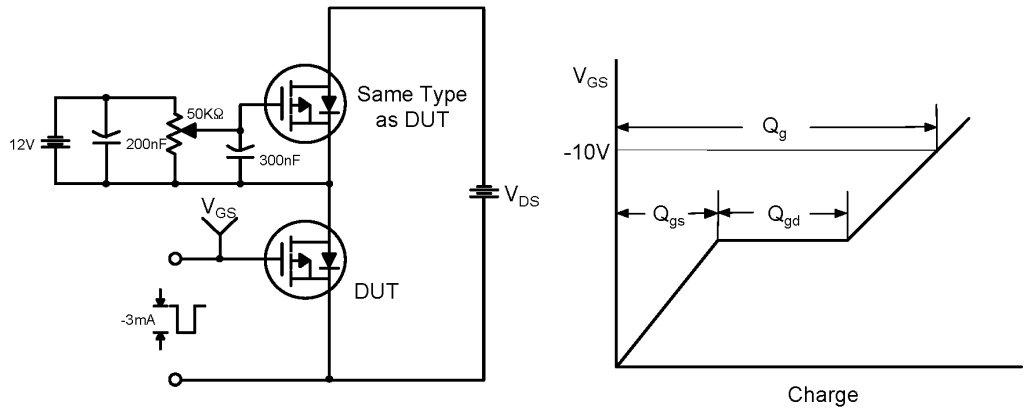


Figure 12: Gate Charge Test Circuit & Waveform

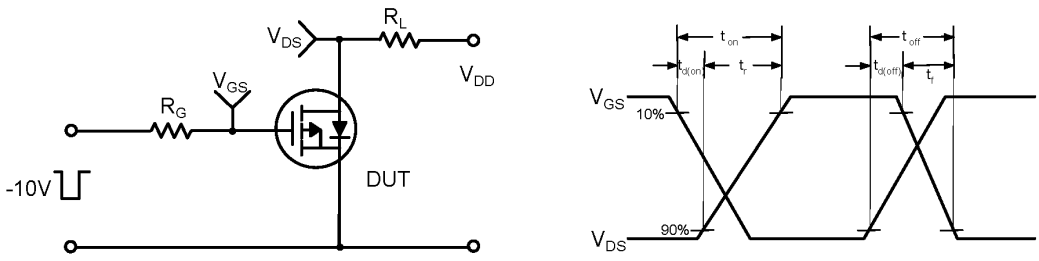


Figure 13: Resistive Switching Test Circuit & Waveforms

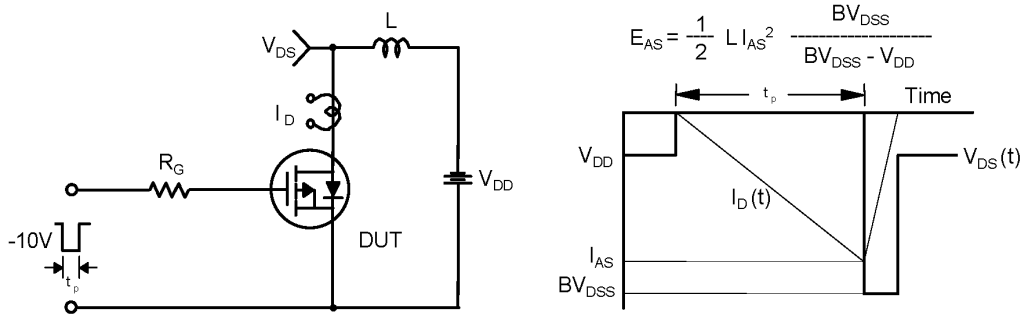


Figure 14: Unclamped Inductive Switching Test Circuit & Waveforms

7.4Typical characteristic

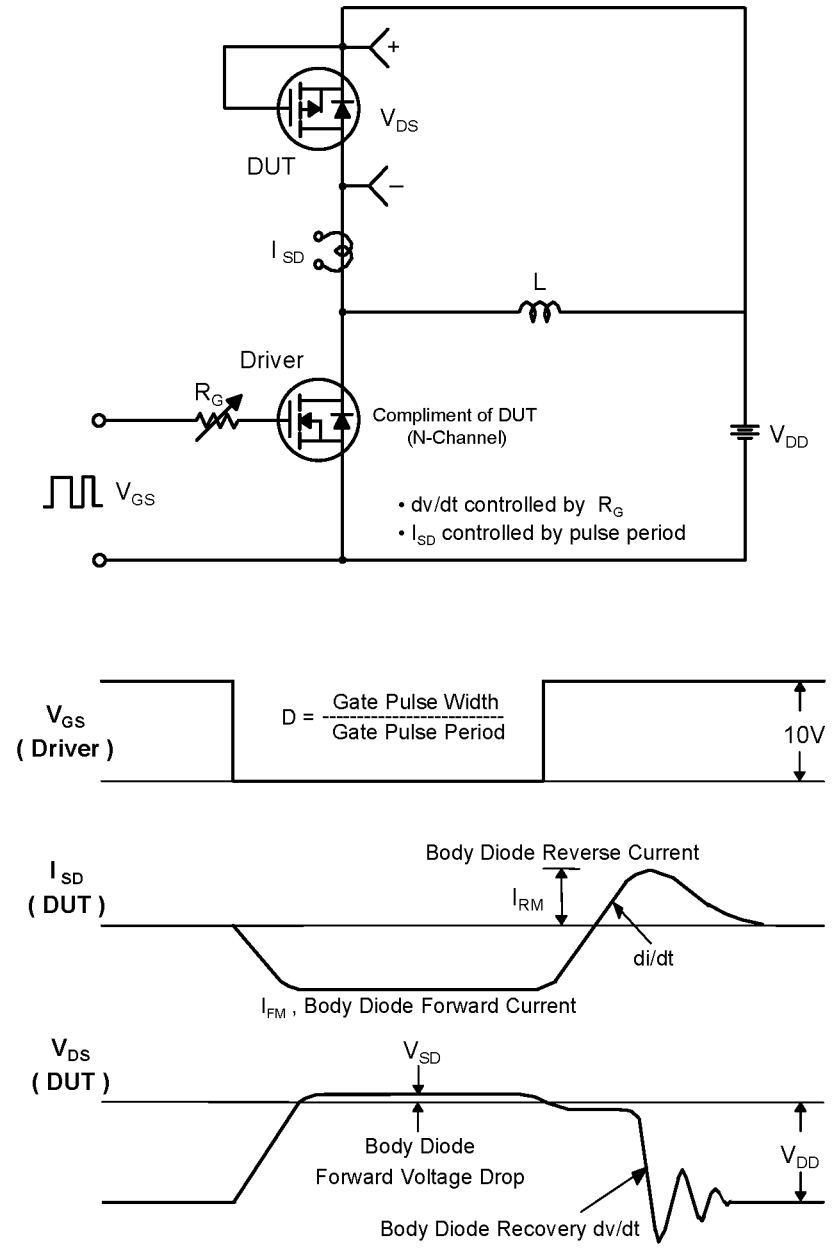
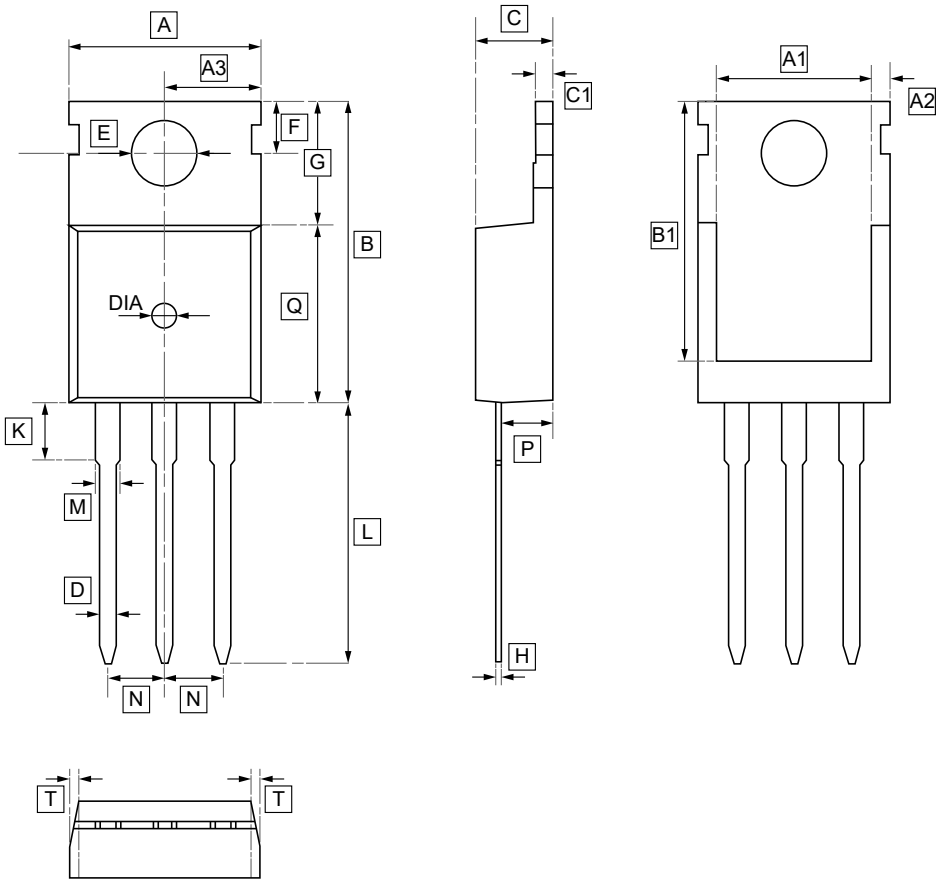


Figure 15: Peak Diode Recovery dv/dt Test Circuit & Waveforms

8.1 TO-220 Package Outline Dimensions

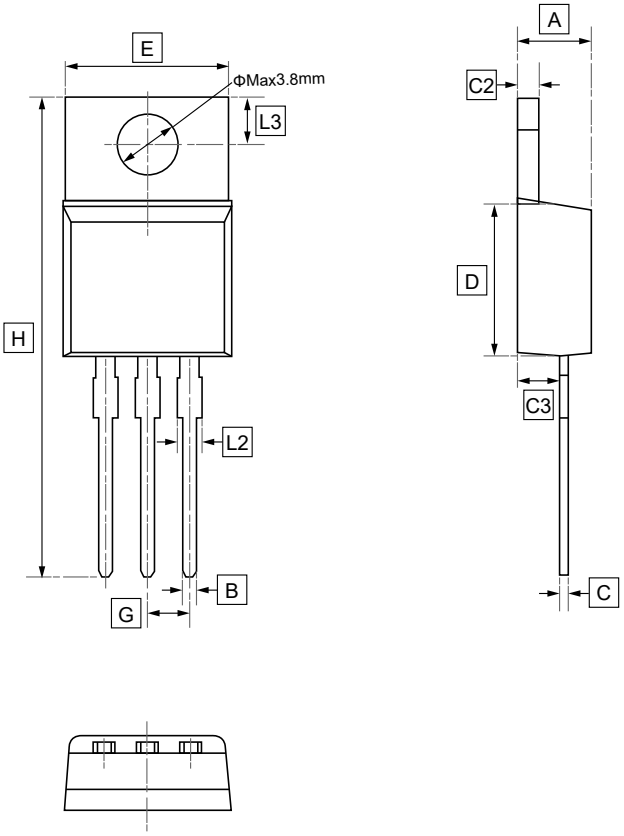


DIMENSIONS (mm are the original dimensions)

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 (deep 0.2)
Max	0.6	3.3	13.6	3.3	1.35	2.59	2.7	9.3		

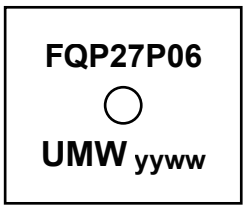
8.2 TO-220 Package Outline Dimensions



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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