UMW IPD50P03P4L-11

-30V P-Channel MOSFET

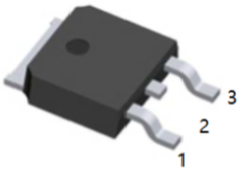
1.Features

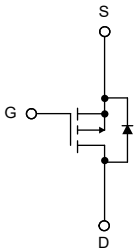
- $V_{DS\ (V)}$=-30V
- I_D=-50A
- $R_{DS(ON)}$<10.5mΩ(V_{GS}=-10V)
- $R_{DS(ON)}$<18mΩ(V_{GS}=-4.5V)
- Logic Level-Enhancement mode
- AEC qualified
- 175°C operating temperature
- Green Product (RoHS compliant)
- Intended for reverse battery protection

2.Pinning information

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

TO-252(DPAK)
top view





3.Absolute Maximum Ratings T_J= 25°C

Parameter	Symbol	Conditions	Value	Units
Continuous drain current	I_D	T_C=25°C, V_{GS}=-10V [1]	-50	A
		T_C=100°C, V_{GS}=-10V [2]	-42	A
Pulsed drain current [2]	$I_{D,pulse}$	T_C=25°C	-200	A
Avalanche energy, single pulse	E_{AS}	I_D=-25A	100	mJ
Avalanche current, single pulse	I_{AS}		-50	A
Gate source voltage	V_{GS}		-16 to 5	V
Power dissipation	P_{tot}	T_C=25°C	58	W
Storage temperature	T_J,T_{STG}		-55 to 175	°C
IEC cimatic category; DIN IEC 68-1			55/175/56	

4.Electrical Characteristic (T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Thermal resistance, junction -case	R_{thJC}				2.6	K/W
SMD version, device on PCB	R_{thJA}	minimal footprint			62	K/W
		6 cm^2 cooling area [3])			40	K/W
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS}=0V, I_D=-1mA	-30			V
Gate threshold voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-85μA	-1	-1.5	-2	V
Zero gate voltage drain current	I_{DSS}	V_{DS}=-24V, V_{GS}=0V, T_J=25°C		-0.02	-1	μA
		V_{DS}=-24V,V_{GS}=0V,T_J=125°C [2])		-7	-70	μA
Gate-source leakage current	I_{GSS}	V_{GS}=-16V, V_{DS}=0V			-100	nA
Drain-source on-state resistance [5])	$R_{DS(ON)}$	V_{GS}=-4.5V, I_D=-25A		13	18	mΩ
		V_{GS}=-10V, I_D=-50A		8.3	10.5	mΩ
Input capacitance	C_{iss}	V_{GS}=0V, V_{DS}=-25V, f=1MHz		2900		pF
Output capacitance	C_{oss}			835	3770	pF
Reverse transfer capacitance	C_{rss}			21	1090	pF
Turn-on delay time	$t_{D(on)}$	V_{DD}=-15V, V_{GS}=-10V I_D=-50A, R_G=3.5Ω		7	42	ns
Rise time	t_r			3		ns
Turn-off delay time	$t_{D(off)}$			45		ns
Fall time	t_f			14		ns
Gate to source charge	Q_{gs}	V_{DD}=-24V, I_D=-50A V_{GS}=0 to -10V		11	14	nC
Gate to drain charge	Q_{gd}			5	10	nC
Gate charge total	Q_g			42	55	nC
Gate plateau voltage	$V_{plateau}$			-3.6		V
Diode continous forward current [2])	I_S	T_C=25°C			-50	A
Diode pulse current [2])	$I_{s,pulse}$				-200	A

Diode forward voltage	V_{SD}	V_{GS}=0V, I_F=-50A, T_J=25°C		-1	-1.3	V
Reverse recovery time [2)]	t_{rr}	V_R=-15V, I_F=40A, di_F/dt=-100A/µs		35		ns
Reverse recovery charge [2)]	Q_{rr}			26		nC

Notes:

[1)] Current is limited by bondwire; with an R_{thJC} = 2.6K/W the chip is able to carry 60A at 25°C.

[3)] Specified by design. Not subject to production test.

[5)] Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR4 with 6 cm^2 (one layer, 70 µm thick) copper area for drain connection. PCB is vertical in still air.

5.1Typical characteristic

$P_{tot}=f(T_C)$; $V_{GS}\leq$-6V

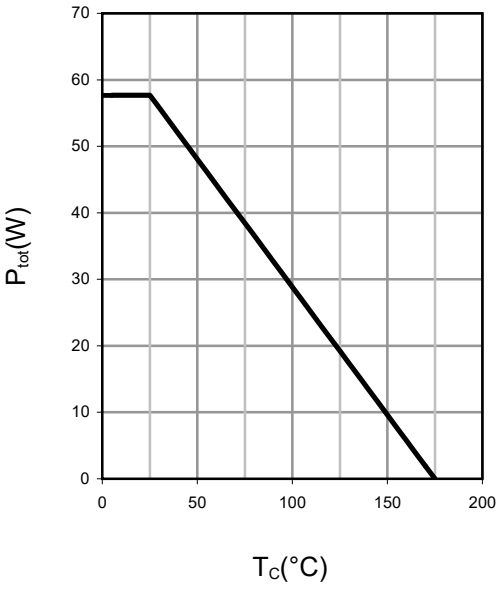


Fig 1. Power dissipation

$I_D=f(T_C)$; $V_{GS}\leq$-6V

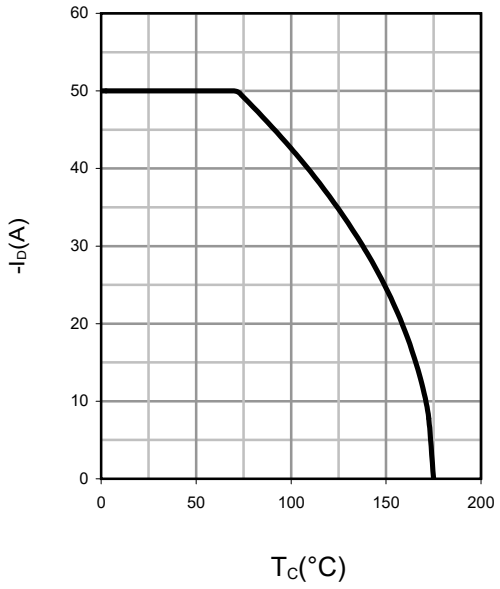


Fig 2. Drain current

ID=f(V_{DS}); T_C=25°C; D=0; parameter: t_p

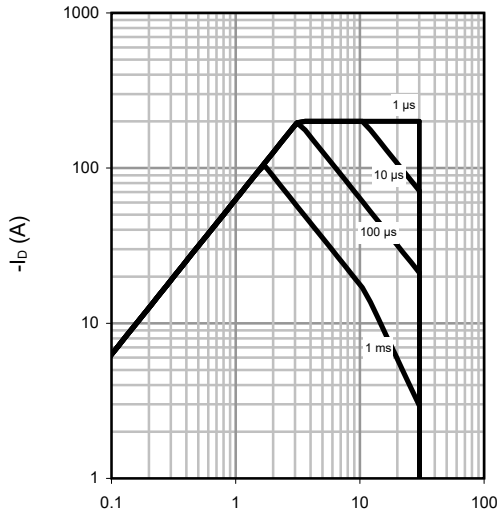


Fig 3. Safe operating area

$Z_{thJC}=f(t_p)$; parameter: D=t_p/T

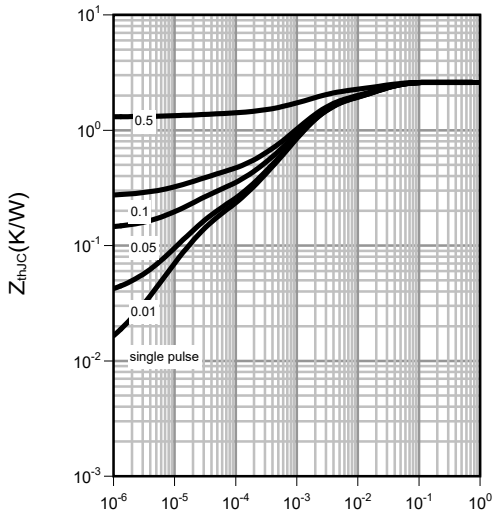


Fig 4. Max transient thermal impedance

5.2Typical characteristic

$I_D=f(V_{DS})$; T_J=25°C; parameter: V_{GS}

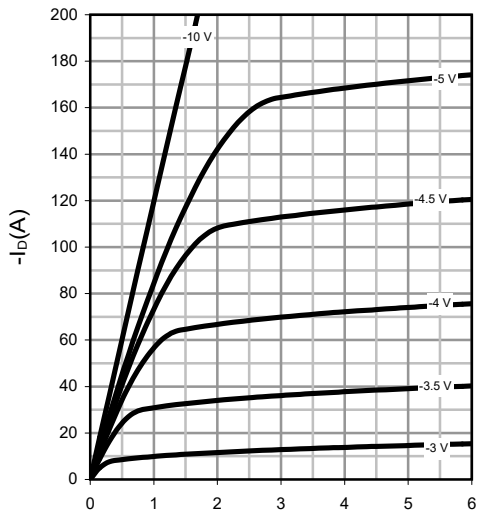


Fig 5. output characteristics

$R_{DS(ON)}=f(I_D)$; T_J=25°C; parameter: V_{GS}

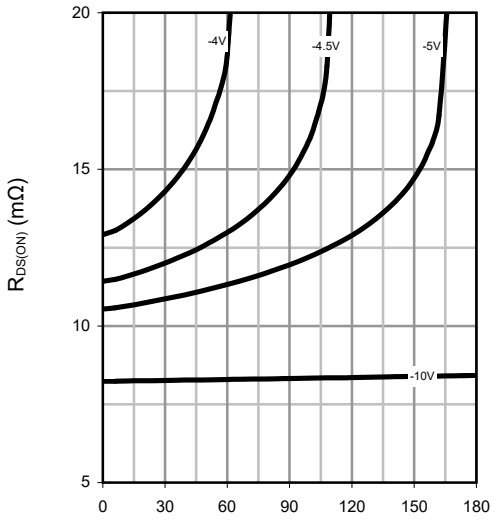


Fig 6. drain-source on resistance

$I_D=f(V_{GS})$; V_{DS}=-6V; parameter: T_J

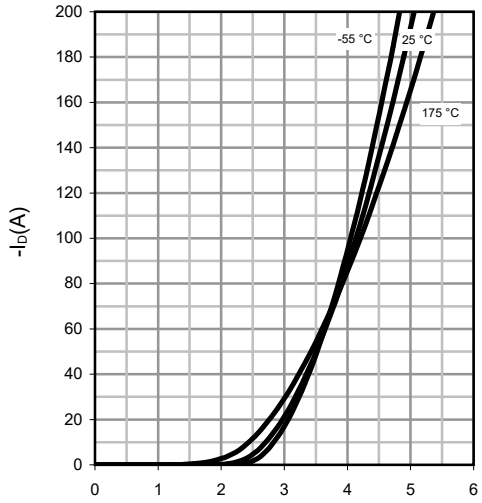


Fig 7. transfer characteristics

$R_{DS(ON)}$= $f(T_J)$; I_D=-50A; V_{GS}=-10V

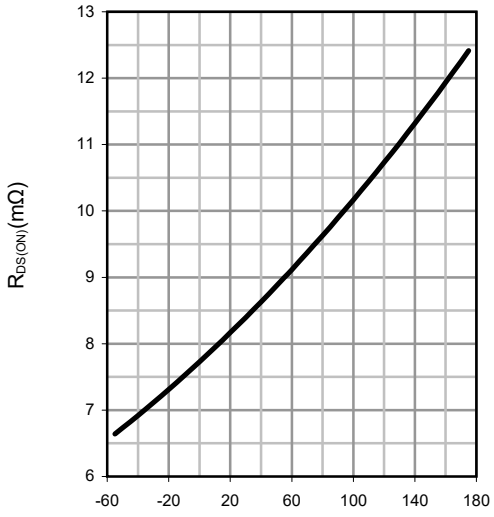


Fig 8. drain-source on-state resistance

5.3Typical characteristic

$V_{GS(th)}=f(T_J);V_{GS}=V_{DS}$; parameter:$I_D$

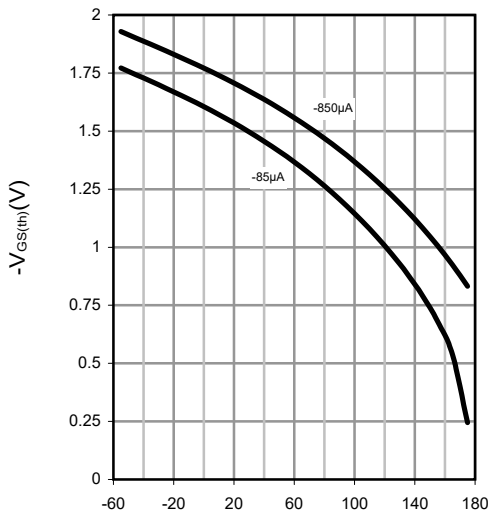


Fig 9. gate threshold voltage

$C=f(V_{DS})$; V_{GS}=0V; f=1MHZ

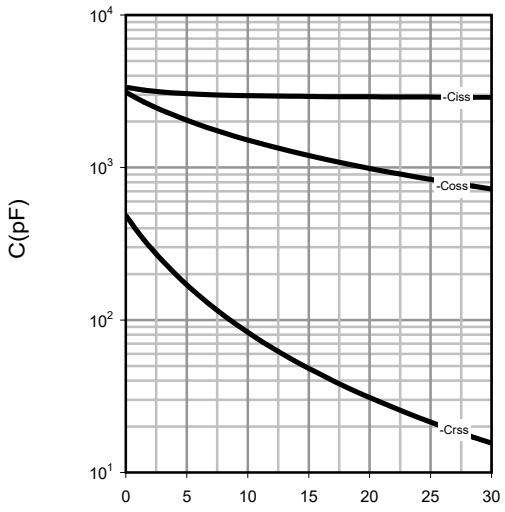


Fig 10. capacitances

$I_F=f(V_{SD})$; parameter: T_J

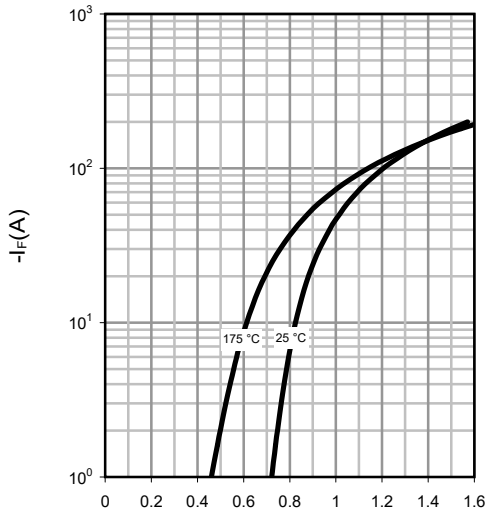


Fig 11. Typical forward diode characteristicis

$I_{AS}=f(t_{AV})$; parameter: $T_{j(start)}$

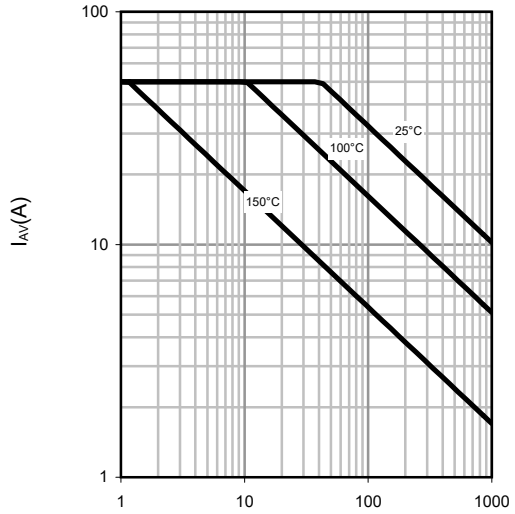


Fig 12. Avalanche characteristics

5.4Typical characteristic

$E_{AS}=f(T_J)$; parameter: I_D

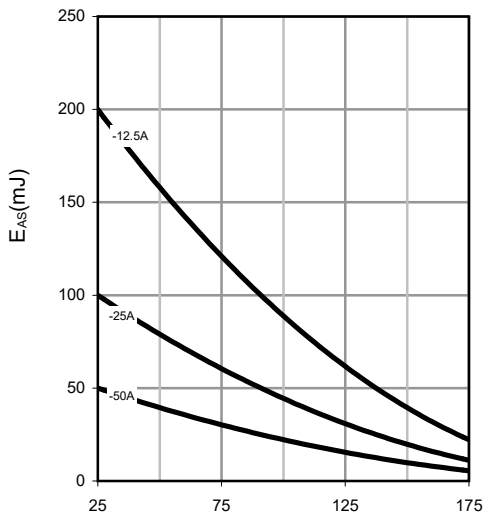


Fig 13. Avalanche energy

$V_{BR(DSS)}=f(T_J)$; I_D=-1m A

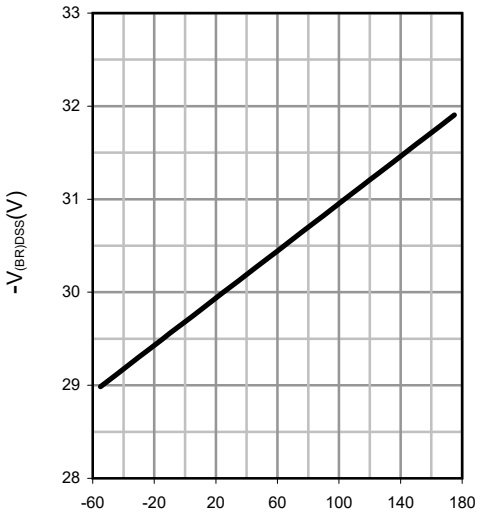


Fig 14. Drain-source breakdown voltage

$V_{GS}=f(Q_{gate})$; I_D=-50A pulsed; parameter: V_{DD}

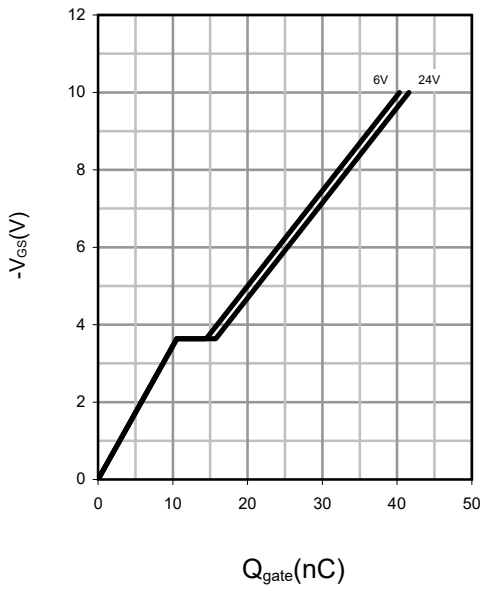


Fig 15. gate charge

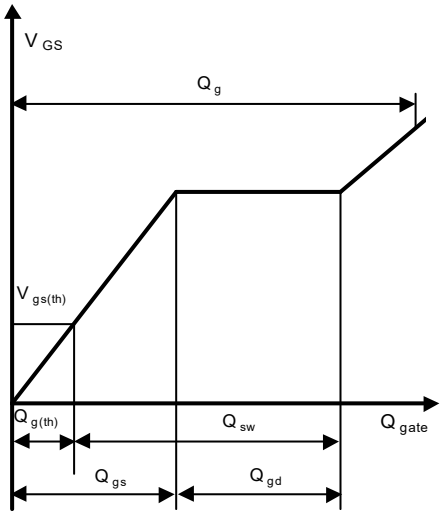
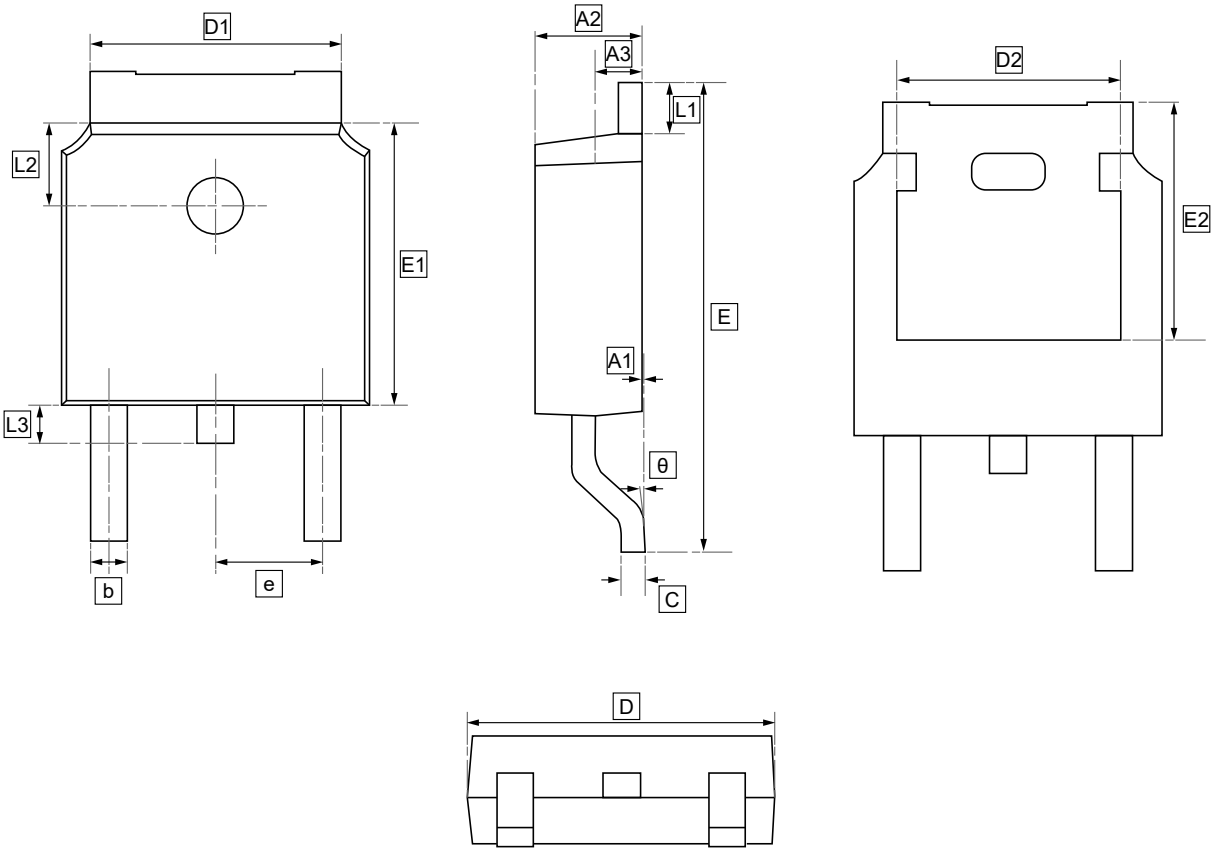


Fig 16. Gate charge waveforms

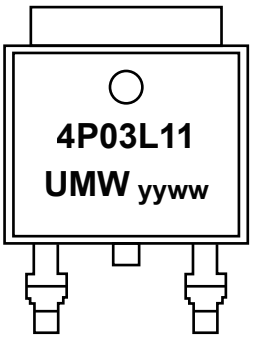
6.TO-252 Package Outline Dimensions



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

7.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IPD50P03P4L-11	TO-252	2500	Tape and reel

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