UMW IRLB8748PBF

30V N-Channel MOSFET

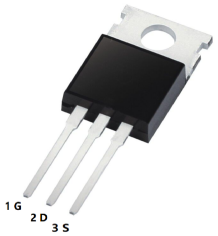
1.Features

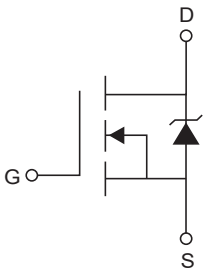
- $V_{DS\ (V)}$=30V
- ID=78A
- $R_{DS(ON)}$<4.8mΩ(V_{GS}=10V)
- $R_{DS(ON)}$<6.8mΩ(V_{GS}=4.5V)
- Very Low $R_{DS(ON)}$ at 4.5V V_{GS}
- Ultra-Low Gate Impedance
- Lead-Free
- Fully Characterized Avalanche Voltage and Current

2.Pinning information

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

TO-220





3.Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain-to-Source Voltage		V_{DS}	30	V
Gate-to-Source Voltage		V_{GS}	±20	V
Continuous Drain Current, V_{GS}=10V(Silicon Limited)	T_C=25°C	I_D	92 ④	A
Continuous Drain Current, V_{GS}=10V (Silicon Limited)	T_C=100°C		65	A
Continuous Drain Current, V_{GS}=10V (Package Limited)	T_C=25°C		78	A
Pulsed Drain Current ①		I_{DM}	370	A
Maximum Power Dissipation ⑥	T_C=25°C	P_D	75	W
Maximum Power Dissipation ⑥	T_C=100°C		38	W
Linear Derating Factor			0.5	W/°C
Storage Temperature Range		T_J, T_{STG}	-55 to 175	°C
Soldering Temperature, for 10 seconds (1.6mm from case)			300	°C
Mounting torque, 6-32 or M3 screw			10lbin (1.1Nm)	

4.Thermal resistance rating

Parameter	Symbol	Typ	Max	Units
Junction-to-Case ⑥	$R_{\theta JC}$		2	°C/W
Case-to-Sink, Flat Greased Surface	$R_{\theta CS}$	0.5		°C/W
Junction-to-Ambient ⑤	$R_{\theta JA}$		62	°C/W

5.Electrical Characteristics @ T_J= 25°C (unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D=250μA, V_{GS}=0V	30			V
Breakdown Voltage Temp. Coefficient	$\Delta BV_{DSS}/\Delta T_J$	I_D=1mA,Reference to 25°C		21		mV/°C
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=40A ③		3.8	4.8	mΩ
		V_{GS}=4.5V, I_D=32A ③		5.5	6.8	
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=50μA	1.35	1.8	2.35	V
Gate Threshold Voltage Coefficient	$\Delta V_{GS(th)}/\Delta T_J$			-7.1		mV/°C
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=24V, V_{GS}=0V			1	μA
		V_{DS}=24V, V_{GS}=0V, T_J=125°C			150	μA
Gate-to-Source Forward Leakage	I_{GSS}	V_{GS}=20V			100	nA
Gate-to-Source Reverse Leakage		V_{GS}=-20V			-100	nA
Forward Transconductance	g_{FS}	V_{DS}=15V, I_D=32A	196			S
Total Gate Charge	Q_g	V_{DS}=15V, V_{GS}=4.5V I_D=32A		15	23	nC
Pre-Vth Gate-to-Source Charge	Q_{gs1}			3.6		nC
Post-Vth Gate-to-Source Charge	Q_{gs2}			2.2		nC
Gate-to-Drain Charge	Q_{gd}			5.9		nC
Gate Charge Overdrive	Q_{gdor}			3.9		nC
Switch Charge (Q_{gs2} + Q_{gd})	Q_{sw}			8.1		nC
Output Charge	Q_{oss}	V_{DS}=16V, V_{GS}=0V		11		nC
Gate Resistance	R_g			2	3.5	Ω
Turn-On Delay Time	$t_{D(on)}$	V_{DD}=15V, V_{GS}=4.5V ③ I_D=32A, R_G=1.8Ω		14		ns
Rise Time	t_r			96		ns
Turn-Off Delay Time	$t_{D(off)}$			16		ns
Fall Time	t_f			34		ns
Input Capacitance	C_{iss}	V_{GS}=0, V_{DS}=15V, f=1.0MHz		2139		pF
Output Capacitance	C_{oss}			464		pF
Reverse Transfer Capacitance	C_{rss}			199		pF

Avalanche Characteristics						
Single Pulse Avalanche Energy ②	E_{AS}				114	mJ
Avalanche Current ①	I_{AR}				32	A
Repetitive Avalanche Energy ①	E_{AR}				7.5	mJ
Diode Characteristics						
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			92④	A
Pulsed Source Current (Body Diode) ①	I_{SM}				370	A
Diode Forward Voltage	V_{SD}	T_J=25°C,I_S=32A,V_{GS}=0V ③			1	V
Reverse Recovery Time	t_{rr}	T_J=25°C, I_F=32A, V_{DD}=15V		23	35	ns
Reverse Recovery Charge	Q_{rr}	dI/dt=200A/μs ③		39	59	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

6.1Typical Characterisitics

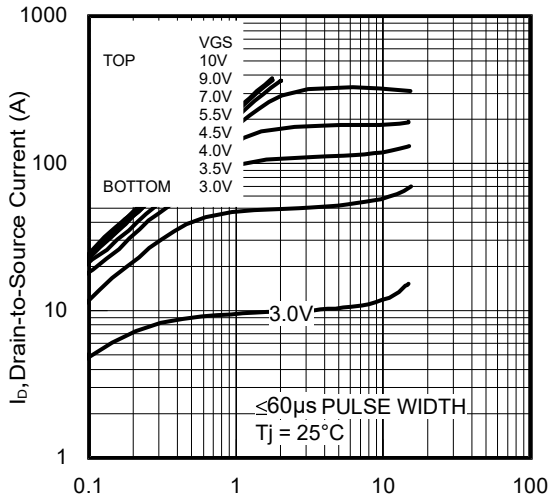


Figure 1: Typical Output Characteristics

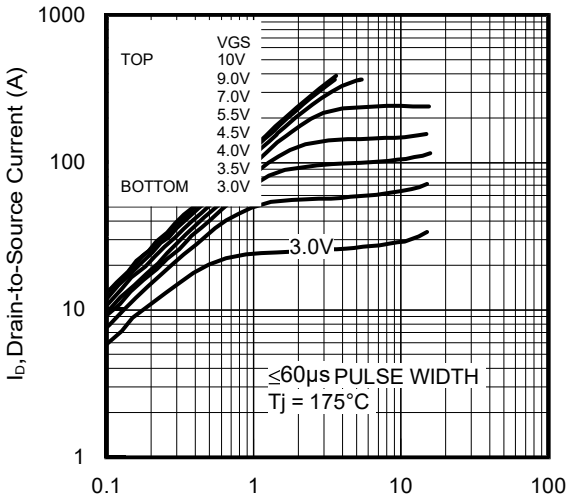


Figure 2: Typical Output Characteristics

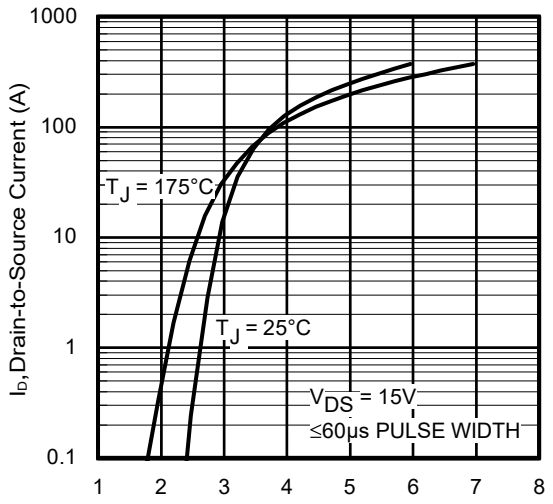


Figure 3: Typical Transfer Characteristics

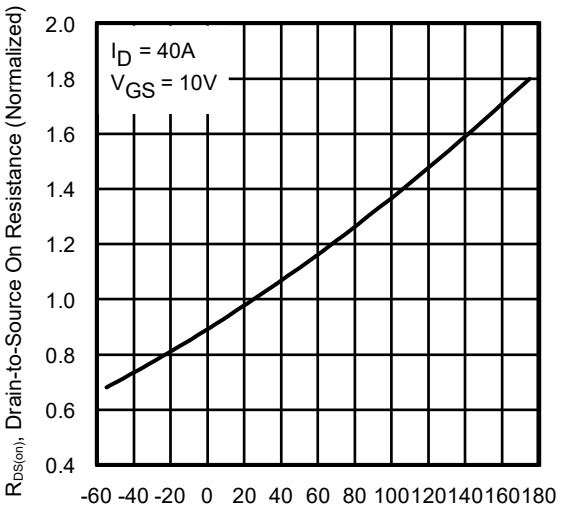
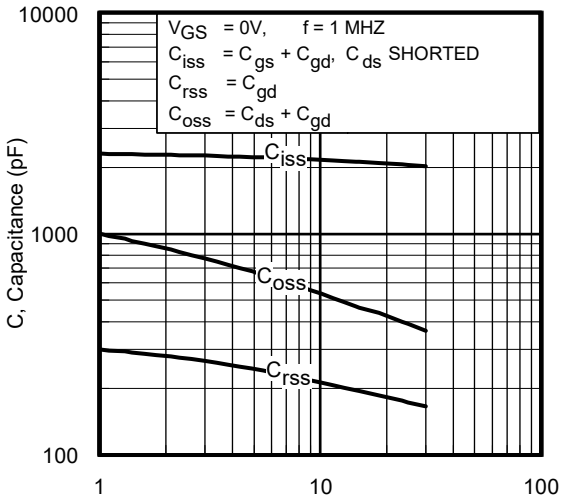


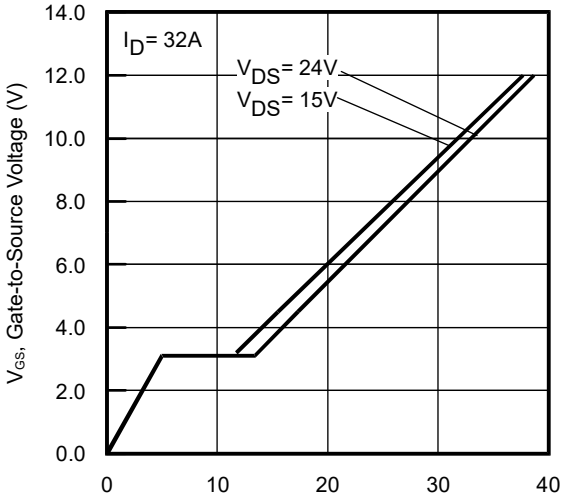
Figure 4: Nomalized On-ResistanceVs. Temperature

6.2Typical Characterisitics



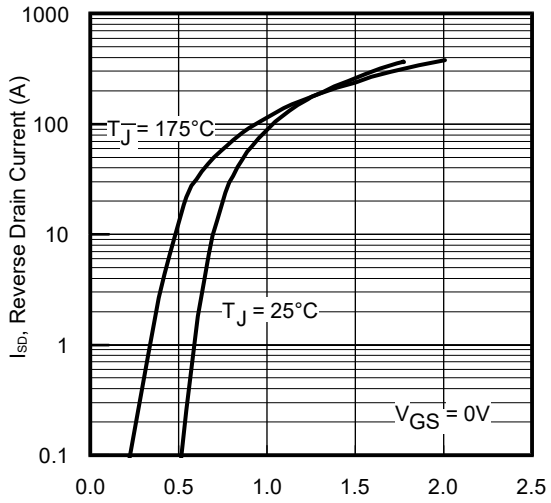
V_{DS} ,Drain-to-Source Voltage (V)

Figure 5: Typical Capacitance Vs. Drain-to-Source Voltage



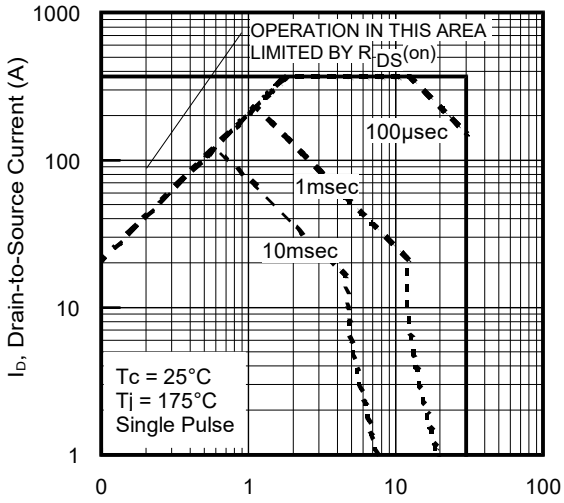
Q_G, Total Gate Charge (nC)

Figure 6: Typical Gate Charge Vs. Gate-to-Source Voltage



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

Figure 7: Typical Source-Drain Diode Forward Voltage



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

Figure 8: Maximum Safe Operating Area

6.3Typical Characterisitics

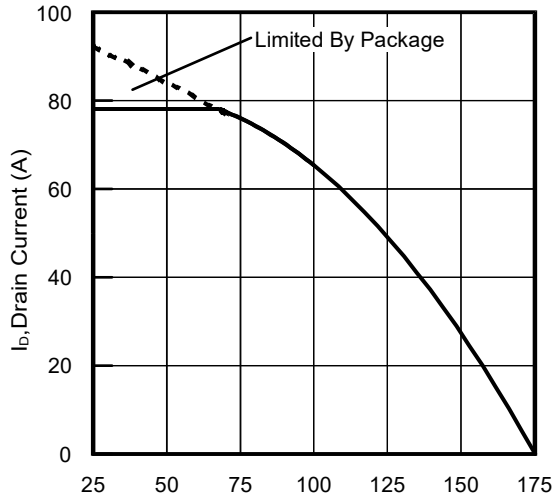


Figure 9: Maximum Drain Current vs. Case Temperature

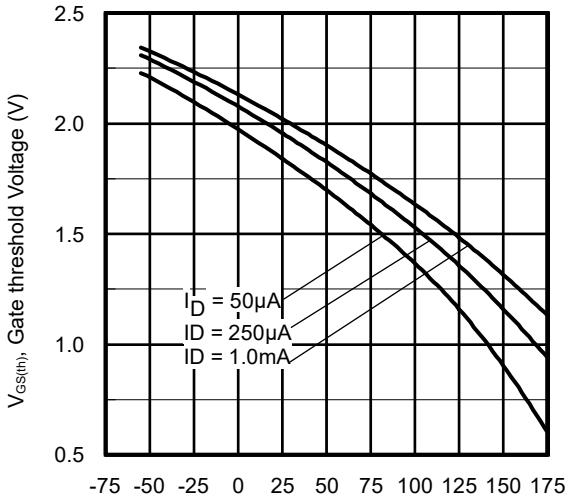


Figure 10: Threshold Voltage vs. Temperature

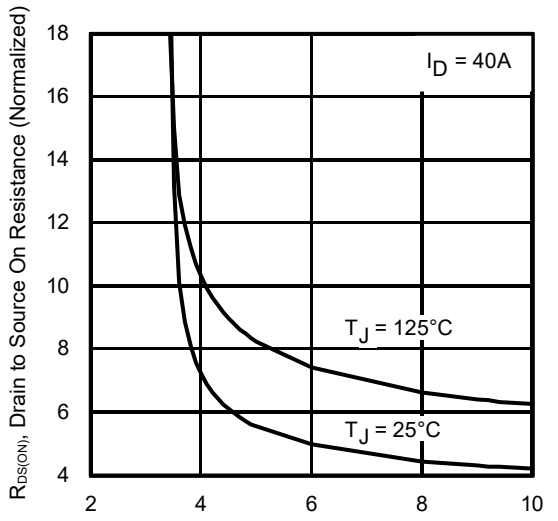


Figure 11: On-Resistance vs. Gate Voltage

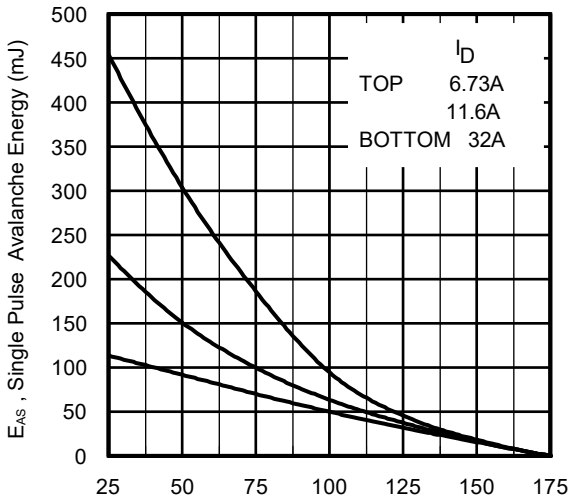


Figure 12: Maximum Avalanche Energy vs. Drain Current

6.4Typical Characterisitics

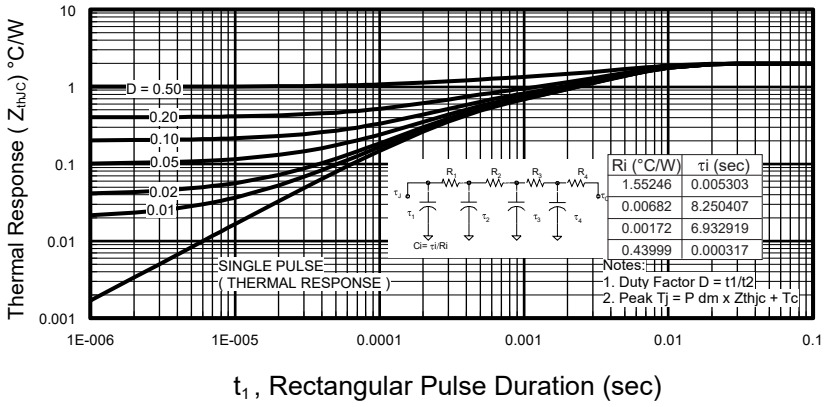


Figure 13: Maximum Effective Transient Thermal Impedance, Junction-to-Case

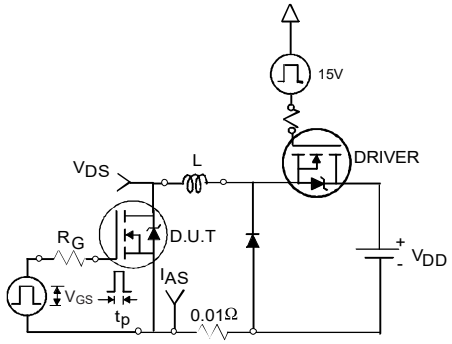


Figure 14a: Unclamped Inductive Test Circuit

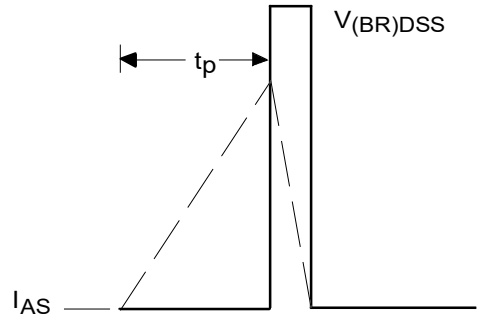


Figure 14b: Switching Time Test Circuit

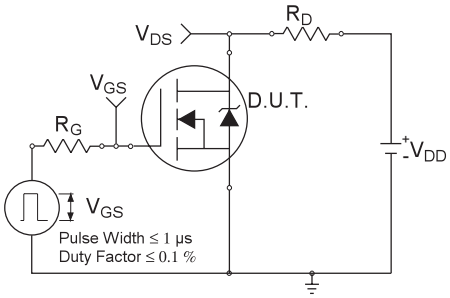


Figure 15a: Unclamped Inductive Waveforms

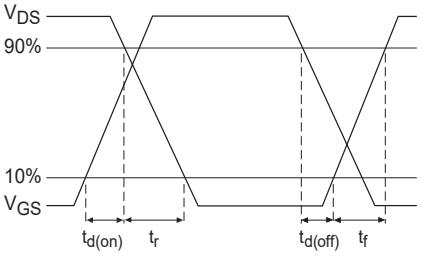
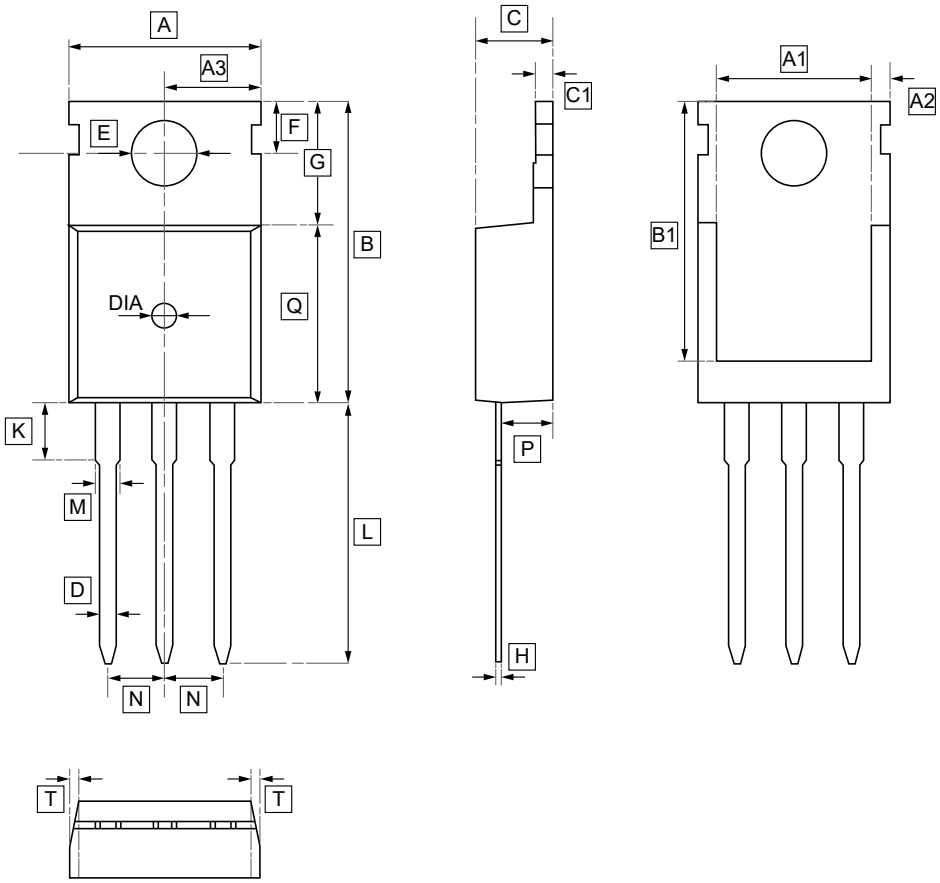


Figure 16b: Switching Time Waveforms

7.1 TO-220 Package Outline Dimensions

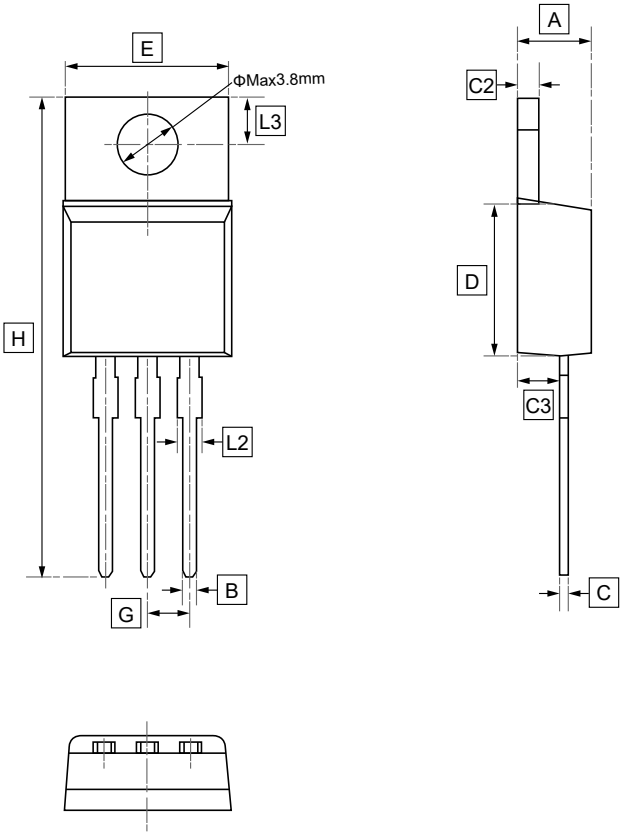


DIMENSIONS (mm are the original dimensions)

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)

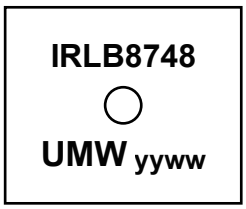
7.2 TO-220 Package Outline Dimensions



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

8.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRLB8748PBF	TO-220	1000	Tube and box

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