

1. Description

The UMW IRF8788TR has been optimized for parameters that are critical in synchronous buck operation including $R_{DS(ON)}$ and gate charge to reduce both conduction and switching losses. The reduced total losses make this product ideal for high efficiency DC-DC converters that power the latest generation of processors for notebook and Netcom applications.

3. Application

- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifier MOSFET for Isolated DC-DC Converters

2. Features

- $V_{DS(V)}=30V$
- $I_D=24A(V_{GS}=10V)$
- $R_{DS(ON)}<2.8m\Omega(V_{GS}=10V)$
- $R_{DS(ON)}<3.8m\Omega(V_{GS}=4.5V)$

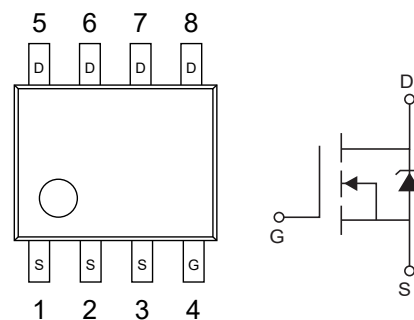
4. Benefits

- Very Low Gate Charge
- Very Low $R_{DS(ON)}$ at 4.5V V_{GS}
- Ultra-Low Gate Impedance
- 20V V_{GS} Max. Gate Rating
- Fully Characterized Avalanche
- Voltage and Current

5. Pinning information

Pin	Symbol	Description
1,2,3	S	SOURCE
4	G	GATE
5,6,7,8	D	DRAIN

SOP-8





6. Absolute Maximum Ratings

Parameter		Symbol	Rating	Units
Drain- Source Voltage		V_{DS}	30	V
Gate-to-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current, $V_{GS}=10V$	$T_A=25^{\circ}C$	I_D	24	A
Continuous Drain Current, $V_{GS}=10V$	$T_A=70^{\circ}C$		19	A
Pulsed Drain Current ①		I_{DM}	190	A
Power Dissipation	$T_A=25^{\circ}C$	P_D	2.5	W
Power Dissipation	$T_A=70^{\circ}C$		1.6	W
Linear Derating Factor			0.02	W/ $^{\circ}C$
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^{\circ}C$

7. Thermal resistance rating

Parameter	Symbol	Typ	Max	Units
Junction-to-Drain Lead ⑤	$R_{\theta JL}$		20	$^{\circ}C/W$
Junction-to-Ambient ④ ⑤	$R_{\theta JA}$		50	$^{\circ}C/W$



8. Electrical Characteristics $T_J=25^\circ\text{C}$

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	$I_D=250\mu\text{A}$, $V_{GS}=0\text{V}$	30			V
Breakdown Voltage Temp. Coefficient	$\Delta BV_{DSS}/\Delta T_J$	$I_D=1\text{mA}$, Reference to 25°C		0.024		$\text{V}/^\circ\text{C}$
Static Drain-to-Source On-Resistance	$R_{DS(ON)}$	$V_{GS}=10\text{V}$, $I_D=24\text{A}$ ③		2.3	2.8	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$, $I_D=19\text{A}$ ③		3.04	3.8	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=100\mu\text{A}$	1.35	1.8	2.35	V
Gate Threshold Voltage Coefficient	$\Delta V_{GS(th)}$	$V_{DS}=V_{GS}$, $I_D=100\mu\text{A}$		-6.59		$\text{mV}/^\circ\text{C}$
Drain-to-Source Leakage Current	I_{DSS}	$V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$			1	μA
		$V_{DS}=24\text{V}$, $V_{GS}=0\text{V}$, $T_J=125^\circ\text{C}$			150	μA
Gate-to-Source Forward Leakage	I_{GSS}	$V_{GS}=20\text{V}$			100	nA
Gate-to-Source Reverse Leakage		$V_{GS}=-20\text{V}$			-100	nA
Forward Transconductance	g_{FS}	$V_{DS}=15\text{V}$, $I_D=19\text{A}$	95			S
Total Gate Charge	Q_g	$V_{DS}=15\text{V}$ $V_{GS}=4.5\text{V}$ $I_D=19\text{A}$ See Fig. 17a & 17b		44	66	nC
Pre-Vth Gate-to-Source Charge	Q_{gs1}			12		nC
Post-Vth Gate-to-Source Charge	Q_{gs2}			4.7		nC
Gate-to-Drain Charge	Q_{gd}			14		nC
Gate Charge Overdrive	Q_{godr}			13.3		nC
Switch Charge ($Q_{gs2} + Q_{gd}$)	Q_{sw}			18.7		nC
Output Charge	Q_{oss}	$V_{GS}=0\text{V}$, $V_{DS}=16\text{V}$		22		nC
Gate Resistance	R_G			0.54	1.09	Ω
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=15\text{V}$		23		ns
Rise Time	t_r	$V_{GS}=4.5\text{V}$		24		ns
Turn-Off Delay Time	$t_{D(off)}$	$I_D=19\text{A}$		23		ns
Fall Time	t_f	$R_G=1.8\Omega$, See Fig.15a & 15b		11		ns
Input Capacitance	C_{iss}	$V_{GS}=0\text{V}$		5720		pF
Output Capacitance	C_{oss}	$V_{DS}=15\text{V}$		980		pF
Reverse Transfer Capacitance	C_{rss}	$f=1.0\text{MHz}$		450		pF



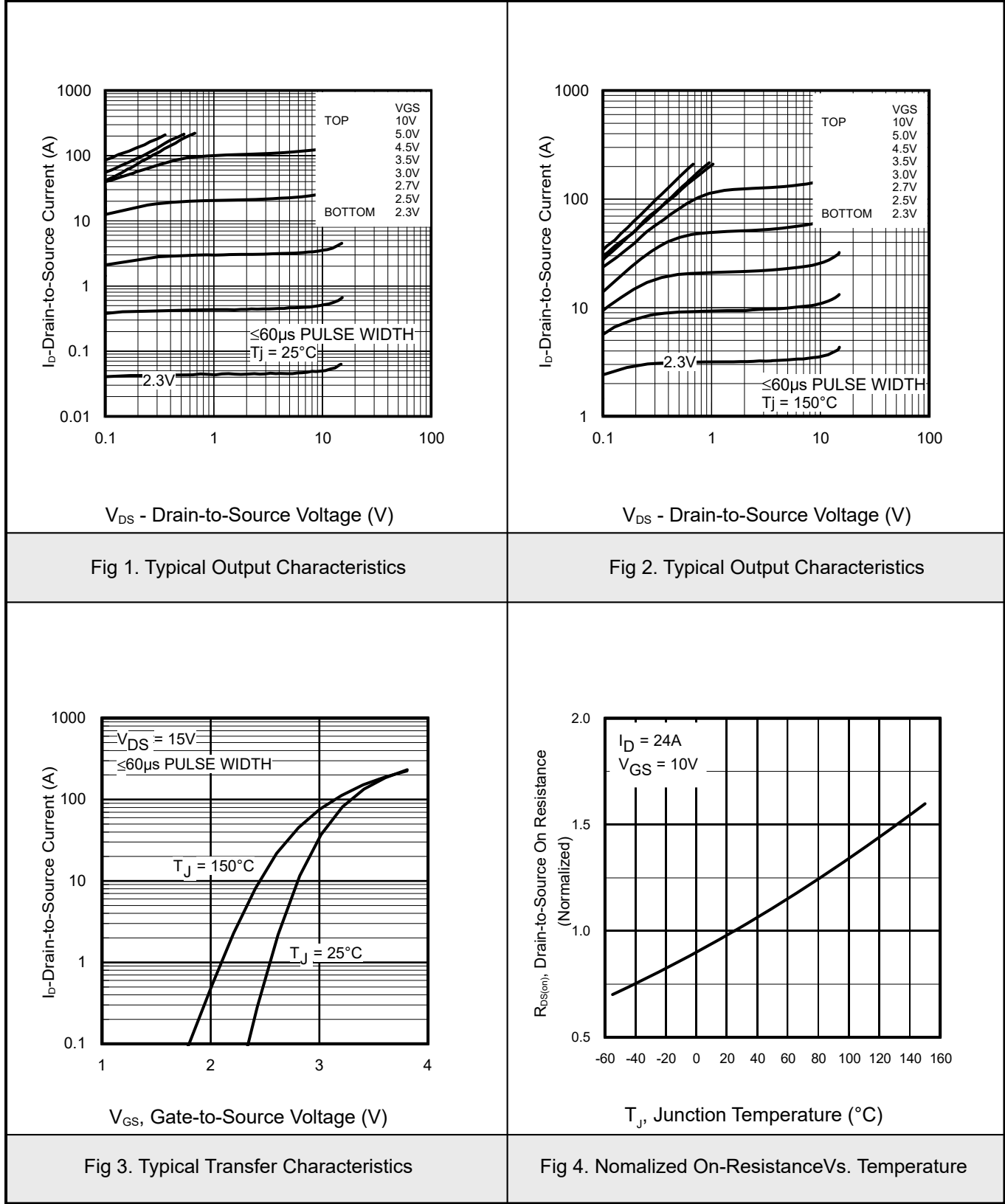
Continuous Source Current (Body Diode)	I_S	MOSFET symbol showing the integral reverse p-n junction diode.			3.1	A
Pulsed Source Current (Body Diode) ①	I_{SM}				190	
Diode Forward Voltage	V_{SD}	$T_J=25^{\circ}\text{C}, I_S=19\text{A}, V_{GS}=0\text{V}$ ③			1	V
		$T_J=25^{\circ}\text{C}, I_F=2.2\text{A}, V_{GS}=0\text{V}$ ③			0.75	V
Reverse Recovery Time	t_{rr}	$T_J=25^{\circ}\text{C}, I_F=19\text{A}, V_{DD}=15\text{V}$ $dI/dt=230\text{A}/\mu\text{s}$ ③		24	36	ns
Reverse Recovery Charge	Q_{rr}			33	50	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by L_S+L_D)				

9.Avalanche Characteristics

Parameter	Symbol	Typ	Max	Units
Single Pulse Avalanche Energy ②	E_{AS}		230	mJ
Avalanche Current ①	I_{AR}		19	A

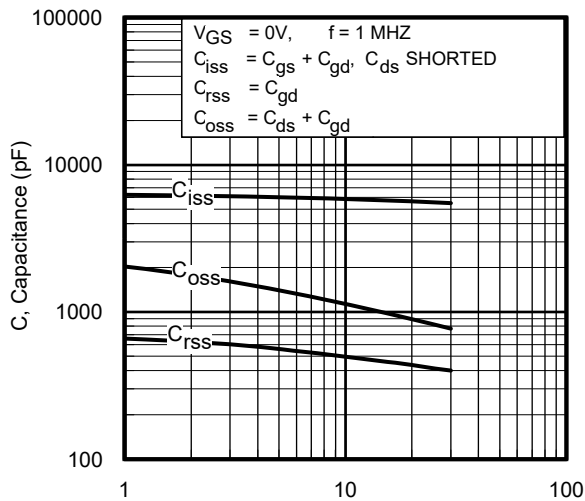


10.1 Typical Characteristics



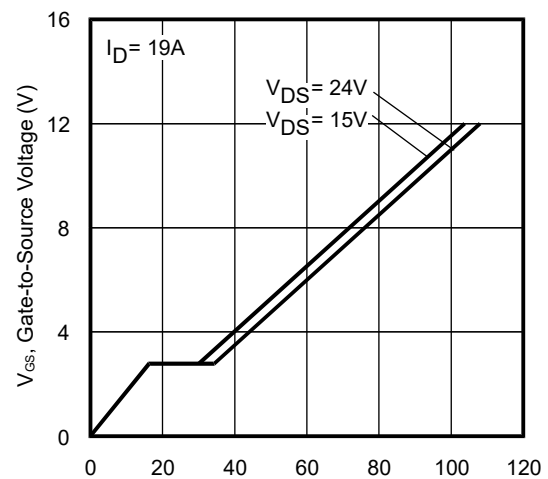


10.2 Typical Characteristics



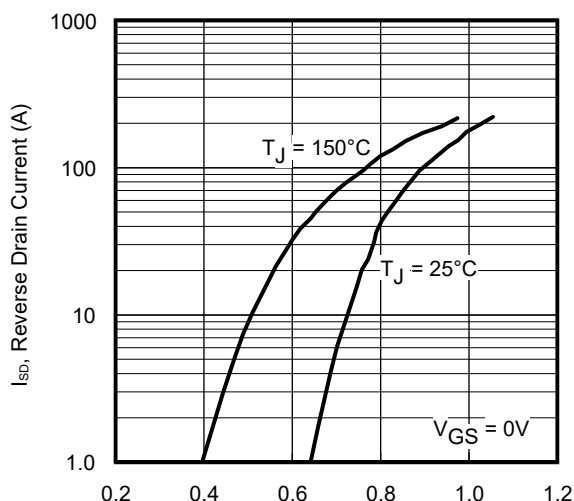
V_{DS} , Drain-to-Source Voltage (V)

Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage



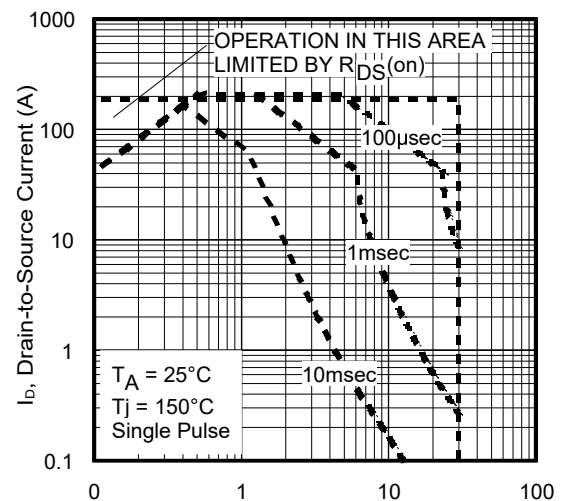
Q_G , Total Gate Charge (nC)

Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage



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

Fig 7. Typical Source-Drain Diode Forward Voltage

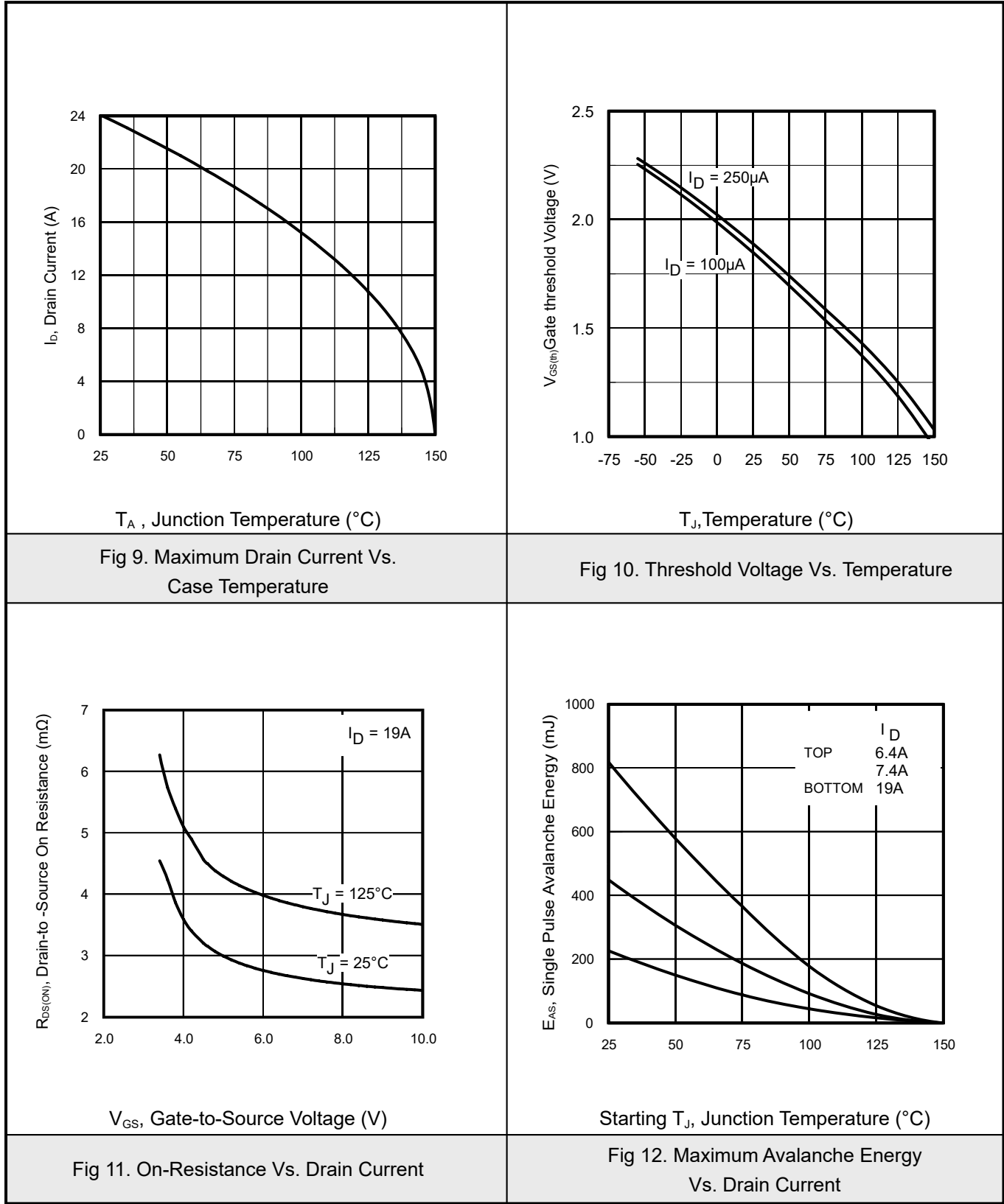


V_{DS} , Drain-to-Source Voltage (V)

Fig 8. Maximum Safe Operating Area

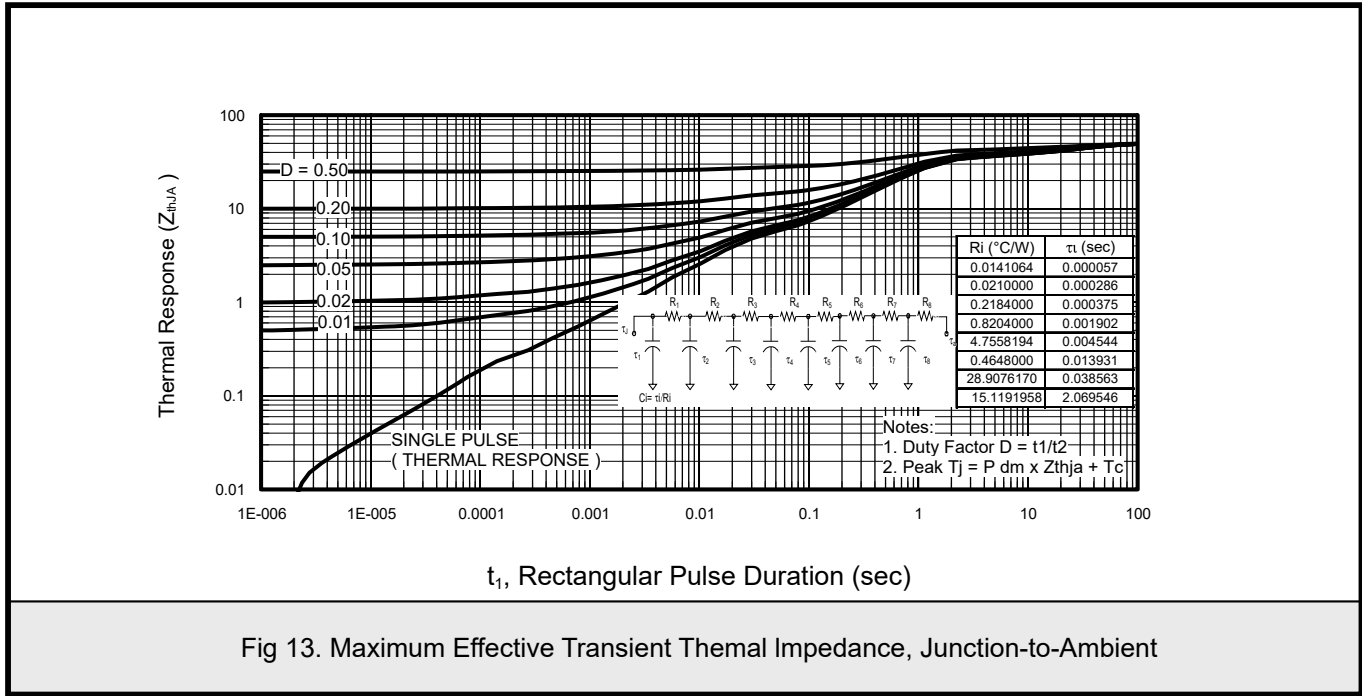


10.3Typical Characteristics



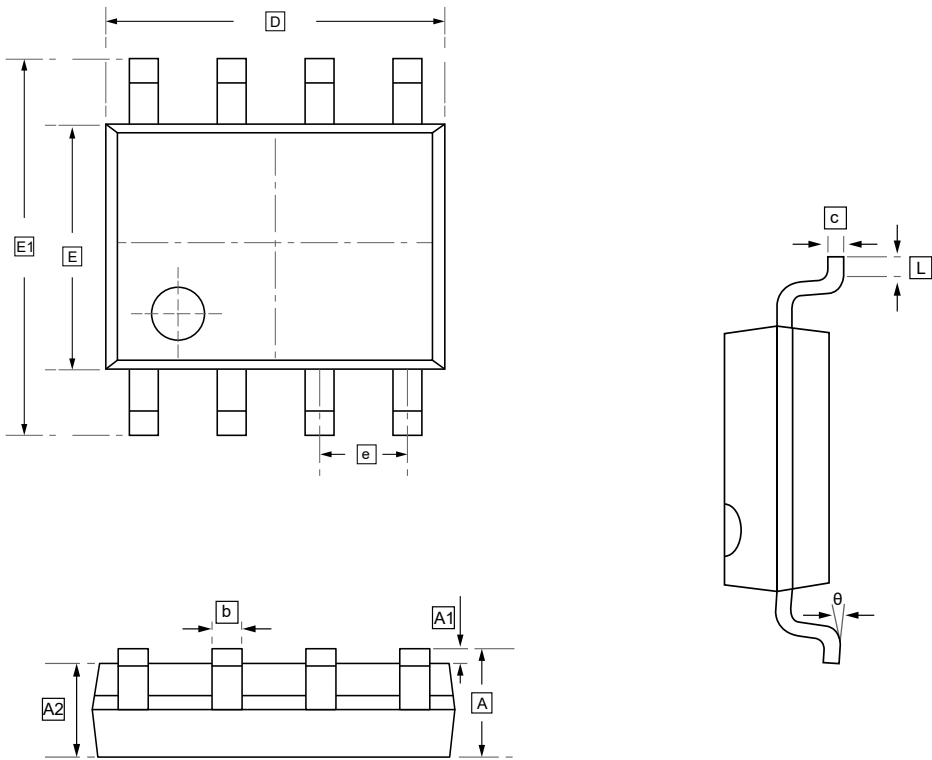


10.4Typical Characteristics





11.SOP-8 Package Outline Dimensions

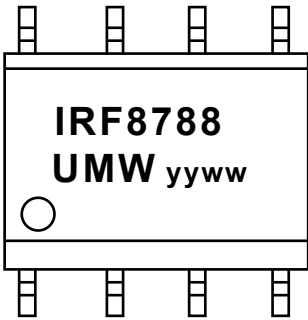


DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0.000	1.350	0.330	0.170	4.700	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	5.100	4.000	6.200	BSC	1.270	8°



12.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRF8788TR	SOP-8	3000	Tape and reel



13.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.

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