

## 1. Description

The uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications. It is ESD protected.

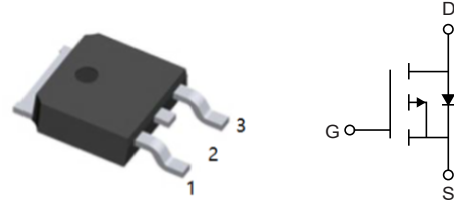
## 2. Features

- $V_{DS(V)} = -100V, I_D = -8A$
- $R_{DS(ON)} < 210m\Omega (V_{GS} = -10V)$  (Typ: 145m)
- Super high dense cell design
- Advanced trench process technology
- Reliable and rugged
- High density cell design for ultra low on-resistance

## 3. Pinning information

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

TO-252(DPAK)  
top view



## 4. Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	$V_{DS}$	-100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	-8	A
Drain Current-Continuous ( $T_C = 100^\circ C$ )	$I_D(100^\circ C)$	-6	A
Pulsed Drain Current	$I_{DM}$	-30	A
Maximum Power Dissipation	$P_D$	40	W
Derating factor		0.32	W/ $^\circ C$
Single pulse avalanche energy (Note 5)	$E_{AS}$	110	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

## 5. Thermal resistance rating

Thermal Resistance, Junction-to-Case (Note 2)	$R_{thJC}$	3.13	$^\circ C/W$
---	------------	------	--------------



## 6. Electrical Characteristics @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-100			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-100V, V_{GS}=0V$			1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 10$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1		-3	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=6A$		210	235	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{GS}=-15V, I_D=-5A$	12			S
Input Capacitance	$C_{iss}$	$V_{DS}=-25V, V_{GS}=0V, F=1\text{MHz}$		760		pF
Output Capacitance	$C_{oss}$			260		pF
Reverse Transfer Capacitance	$C_{rss}$			170		pF
Turn-on Delay Time	$t_{D(on)}$	$V_{DD}=-50V, I_D=-10V$ $V_{GS}=-10V, R_{GEN}=9.1\Omega$		14		nS
Turn-on Rise Time	$t_r$			18		nS
Turn-Off Delay Time	$t_{D(off)}$			50		nS
Turn-Off Fall Time	$t_f$			18		nS
Total Gate Charge	$Q_g$		$V_{DS}=-50V, I_D=-10A$ $V_{GS}=-10V$		25	
Gate-Source Charge	$Q_{gs}$			5		nC
Gate-Drain Charge	$Q_{gd}$			7		nC
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=-10A$			-1.2	V
Diode Forward Current (Note 2)	$I_S$	$T_J=25^\circ\text{C}, I_F=-10A$			-13	A
Reverse Recovery Time	$t_{rr}$			35		nS
Reverse Recovery Charge	$Q_{rr}$	$dI/dt=100A/\mu s$ (Note3)		46		nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by $L_S+L_D$ )				

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production
5. EAS condition:  $T_J=25^\circ\text{C}, V_{DD}=-50V, V_G=-10V, L=0.5\text{mH}, R_g=25$ .

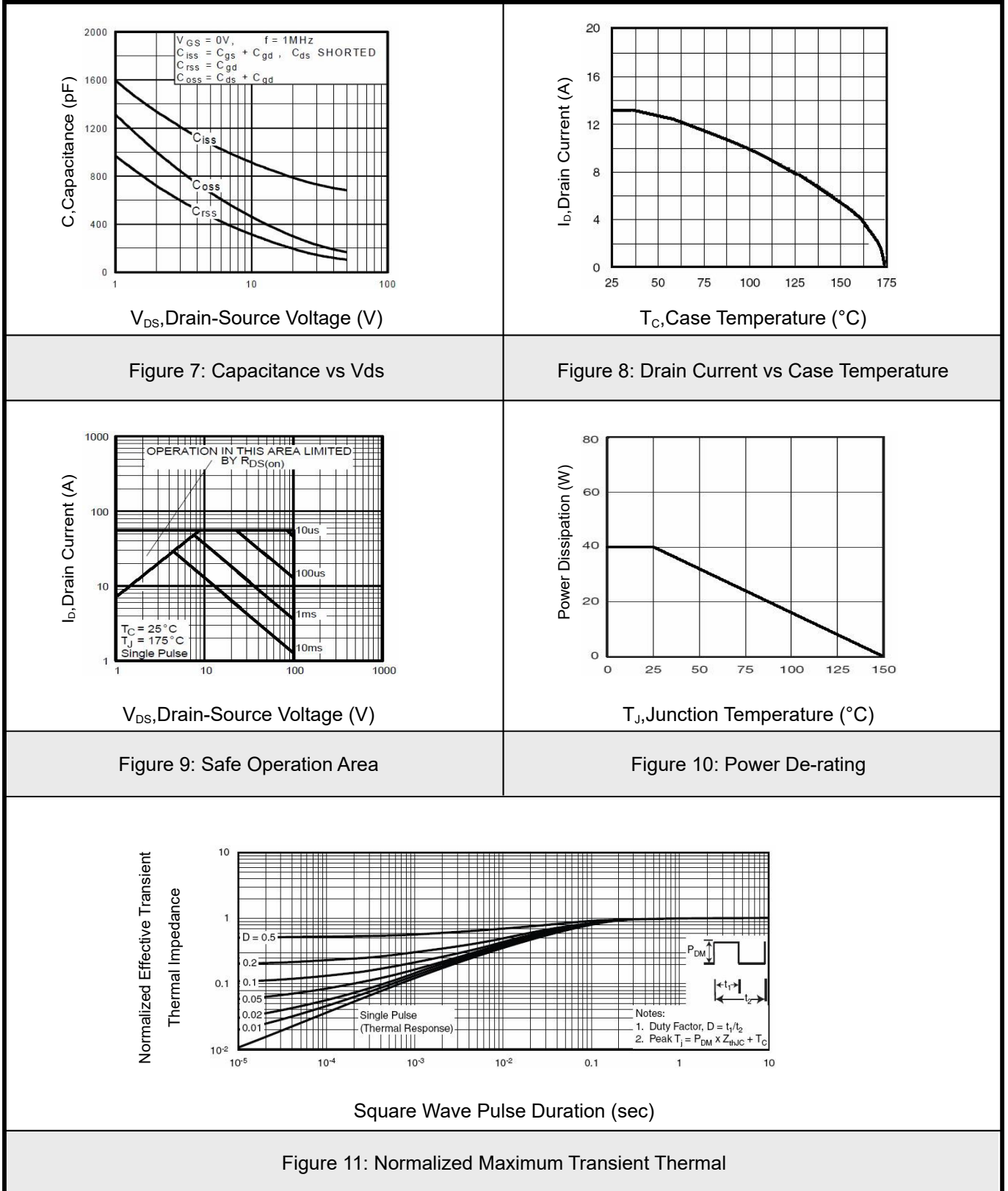


## 7.1 Typical Characteristics

<p style="text-align: center;"><math>I_{D, \text{Drain Current (A)}}</math></p> <p style="text-align: center;"><math>V_{DS, \text{Drain-to-Source Voltage (V)}}</math></p>	<p style="text-align: center;">Normalized On-Resistance</p> <p style="text-align: center;"><math>T_J, \text{Junction Temperature (}^\circ\text{C)}</math></p>
<p style="text-align: center;">Figure 1: Output Characteristics</p>	<p style="text-align: center;">Figure 2: Rdson-Junction Temperature</p>
<p style="text-align: center;"><math>I_{D, \text{Drain Current (A)}}</math></p> <p style="text-align: center;"><math>V_{GS, \text{Gate-Source Voltage (V)}}</math></p>	<p style="text-align: center;"><math>V_{GS, \text{Gate-Source Voltage (V)}}</math></p> <p style="text-align: center;"><math>Q_G, \text{Gate Charge (nC)}</math></p>
<p style="text-align: center;">Figure 3: Transfer Characteristics</p>	<p style="text-align: center;">Figure 4: Gate Charge</p>
<p style="text-align: center;"><math>R_{DS(on)}, \text{On Resistance}</math></p> <p style="text-align: center;"><math>I_{D, \text{Drain Current (A)}}</math></p>	<p style="text-align: center;"><math>I_S, \text{Reverse Drain Current (A)}</math></p> <p style="text-align: center;"><math>V_{SD, \text{Source-Drain Voltage (V)}}</math></p>
<p style="text-align: center;">Figure 5: Rdson- Drain Current</p>	<p style="text-align: center;">Figure 6: Source- Drain Diode Forward</p>

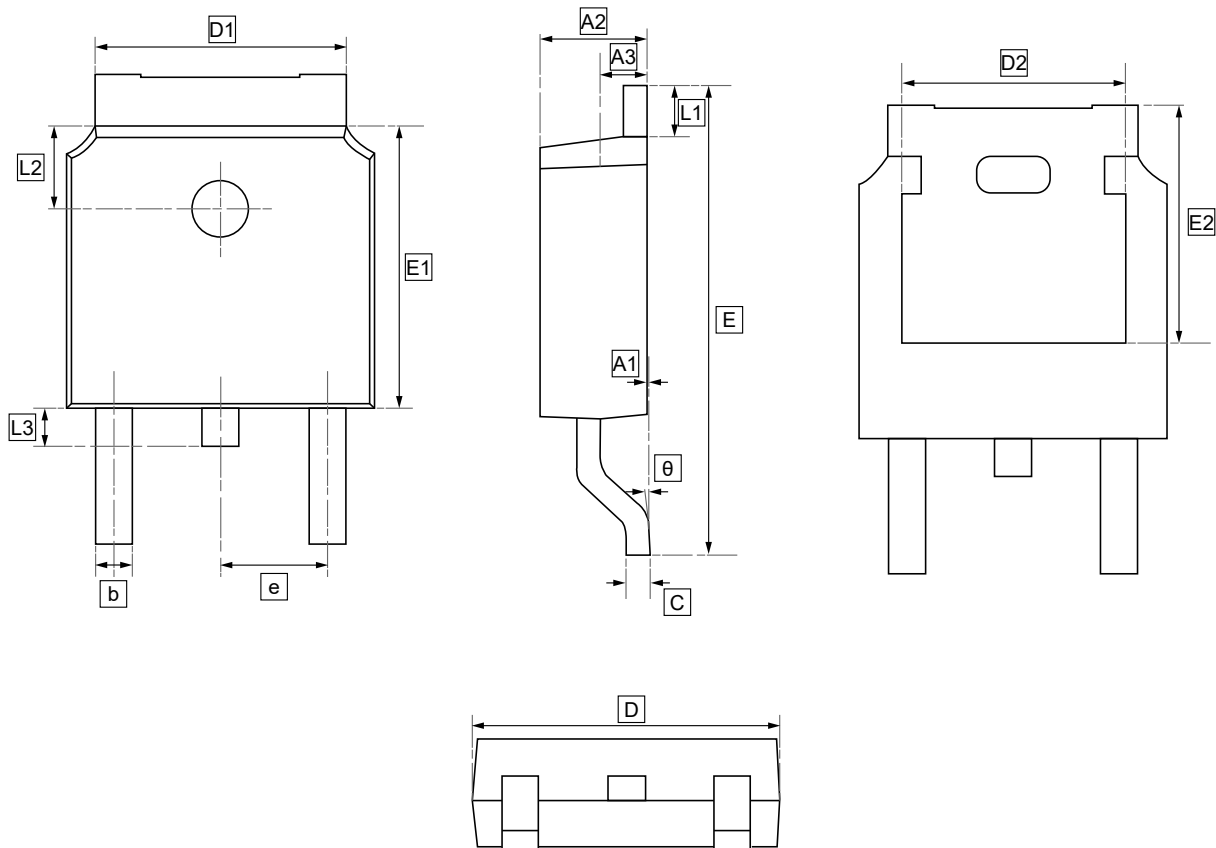


## 7.2 Typical Characteristics





## 8.TO-252 Package Outline Dimensions

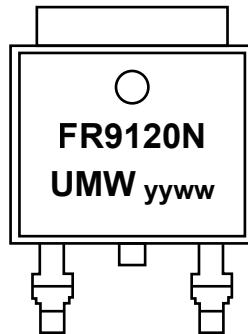


### DIMENSIONS (mm are the original dimensions)

Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
<b>Min</b>	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
<b>Max</b>	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



## 9. Ordering information



yy: Year Code  
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRFR9120NTR	TO-252	2500	Tape and reel



## 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.