

1. Description

The UMW IRL540N 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.

2. Features

- Special process technology for high ESD capability
- High density cell design for ultra low $R_{DS(on)}$
- Fully characterized avalanche voltage and current

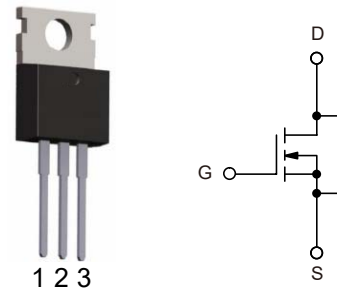
2.1 Features

- $V_{DS(V)}=100V$
- $I_D=30A$
- $R_{DS(ON)}<28m\Omega(V_{GS}=10V)$ (Typ:24 m Ω)

3. Pinning information

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

TO-220-3L



4. Absolute Maximum Ratings $T_c=25^{\circ}C$

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	100	V
Gate-Source Voltage	V_{GS}	± 20	
Drain Current-Continuous	I_D	30	A
Drain Current-Continuous ($T_c=100^{\circ}C$)	$I_D(100^{\circ}C)$	21	
Pulsed Drain Current	I_{DM}	70	
Maximum Power Dissipation		75	W
Derating factor	P_D	0.5	W/ $^{\circ}C$
Single pulse avalanche energy (Note 5)	E_{AS}	256	mJ
Storage Temperature Range	T_{STG}, T_J	-55 to 175	$^{\circ}C$



5. Thermal Resistance Rating

Parameter	Symbol	Typ	Max	Units
Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$		2	°C/W

6. SPECIFICATIONS ($T_c = 25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_{DS}=250\mu A$	100	110		V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$			1	μA
Gate-Body Leakage	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
ON CHARACTERISTIC (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2	3	4	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_{DS}=15A$		24	28	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_{DS}=10A$		15		S
DYNAMIC CHARACTERISTICS (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V, f=1MHz$		2000		pF
Output Capacitance	C_{oss}			300		pF
Reverse Transfer Capacitance	C_{rss}			250		pF
SWITCHING CHARACTERISTICS (Note 4)						
Turn-On Delay Time	$t_{D(on)}$	$V_{GS}=50V, R_L=5\Omega$ $V_{GS}=10V, R_{GEN}=3\Omega$		7		ns
Rise Time	t_r			7		ns
Turn-Off Delay Time	$t_{D(off)}$			29		ns
Fall Time	t_f			7		ns
Total Gate Charge	Q_g	$V_{DS}=50V, I_D=18A, V_{GS}=10V$		39		nC
Gate to Source Gate Charge	Q_{gs}			8		nC
Gate to Drain“Miller”Charge	Q_{gd}			12		nC

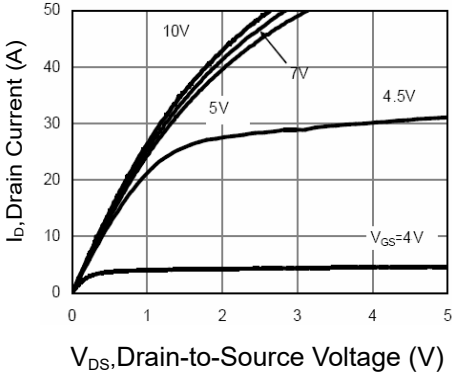
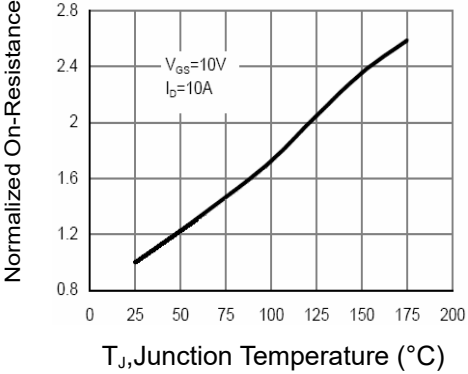
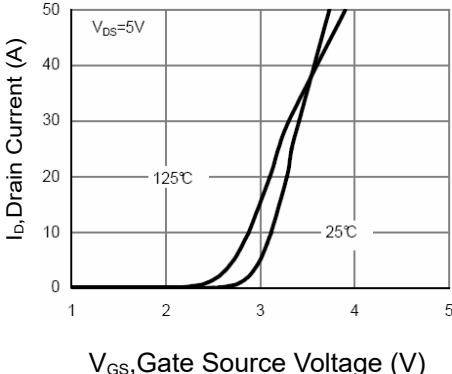
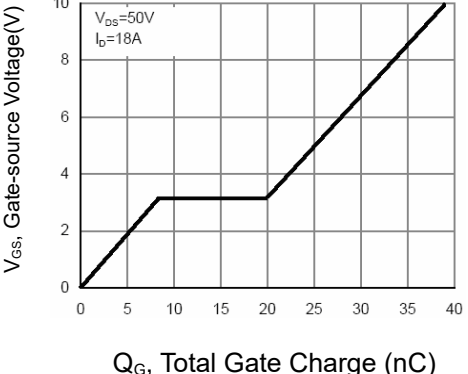
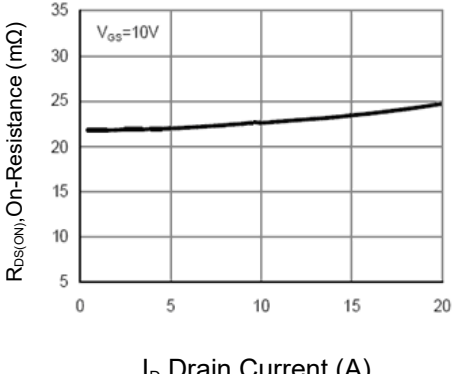
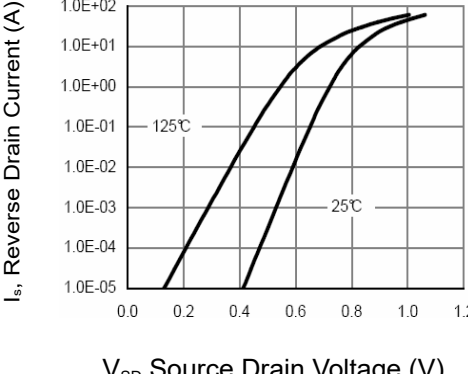


DRAIN-SOURCE DIODE CHARACTERISTICS						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=20A$			1.2	V
Diode Forward Current (Note 2)	I_S				30	A
Reverse Recovery Time	t_{rr}	$T_J=25^{\circ}C, I_F=18A$		32		ns
Reverse Recovery Charge	Q_{rr}	$dI/dt=100A/\mu s$ (Note 3)		53		nC
Forward Turn-On Time	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 : $T_J=25^{\circ}C, V_{DD}=50V, V_G=10V, L=0.5mH, R_g=25\Omega, I_{AS}=32A$.



7.1 Typical Characteristics

	
Figure 1: Output Characteristics	Figure 2: Rdson-Junction Temperature
	
Figure 3: Transfer Characteristics	Figure 4: Gate Charge
	
Figure 5: Rdson- Drain Current	Figure 6: Source- Drain Diode Forward



7.2 Typical Characteristics

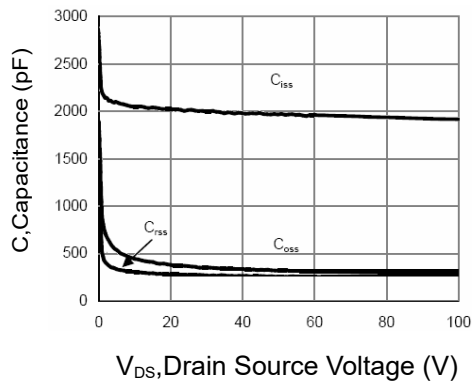


Figure 7: Capacitance vs Vds

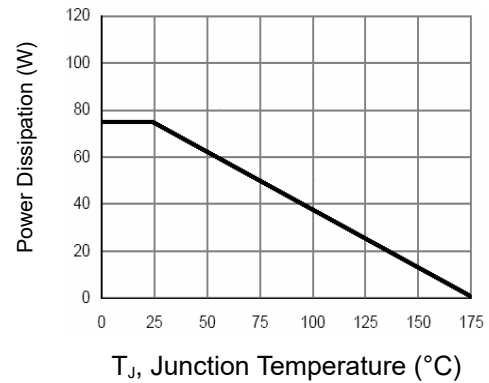


Figure 8: Power De-rating

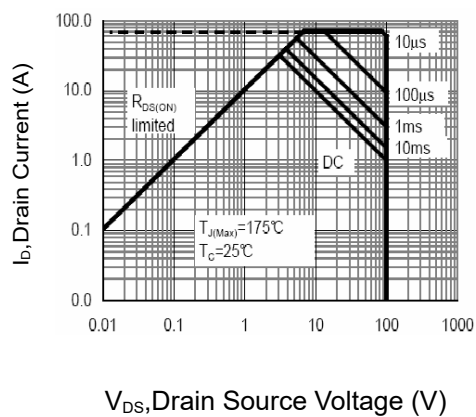


Figure 9: Safe Operation Area

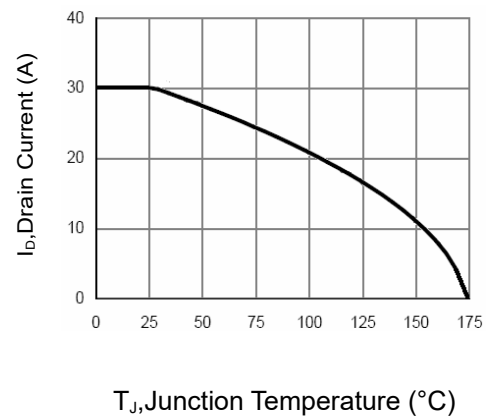


Figure 10: Current- Junction Temperature

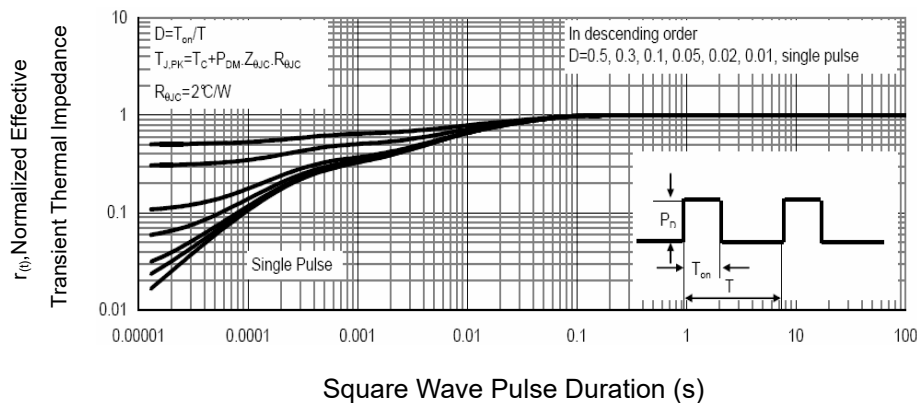
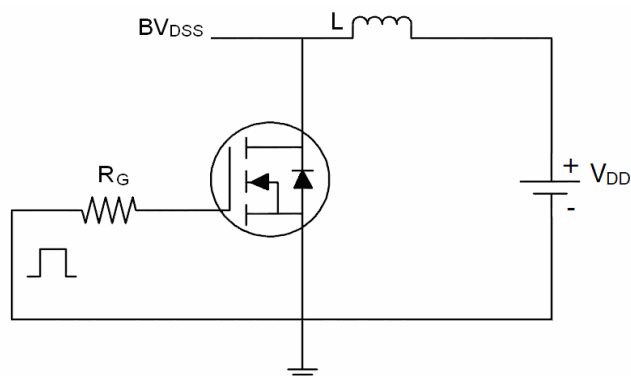
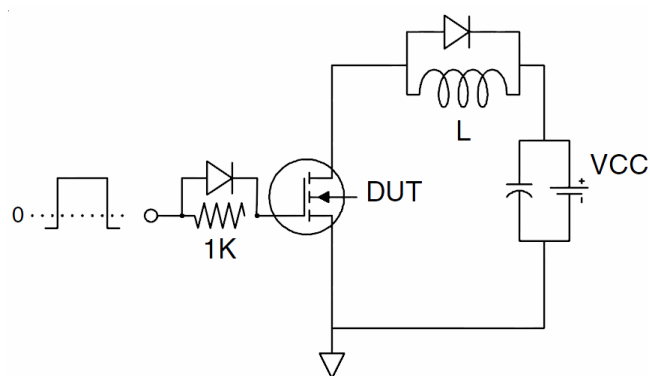
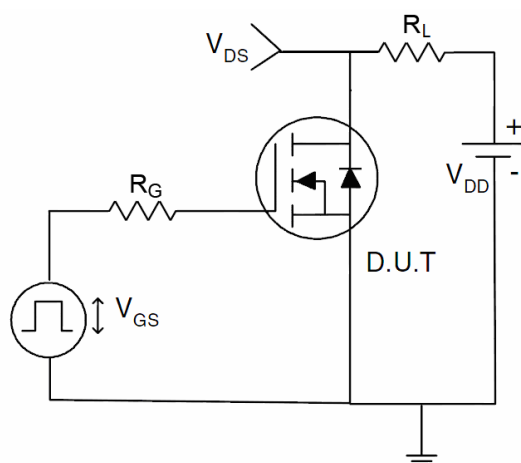


Figure 11: Normalized Thermal Transient Impedance

1) E_{AS} Test Circuit

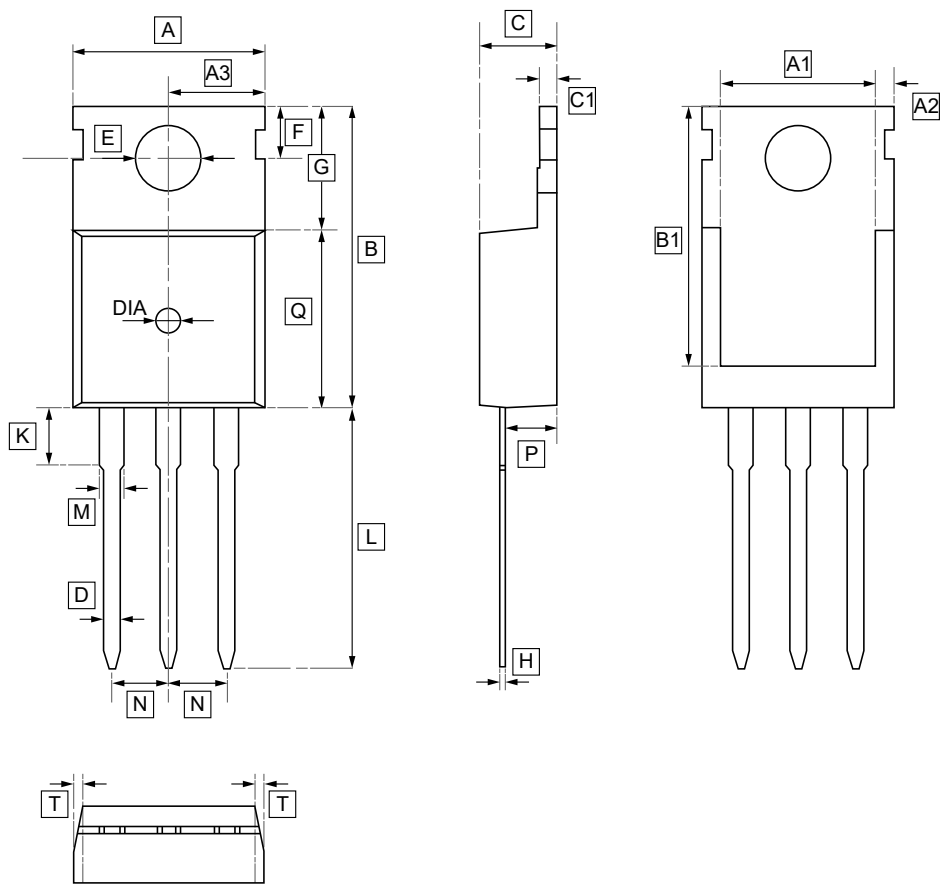
2) Gate Charge Test Circuit



3) Switch Time Test Circuit



8.TO-220 Package Outline Dimensions



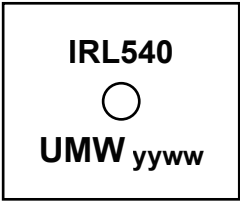
DIMENSIONS (mm are the original dimensions)

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)



9.Ordering information



yy: Year Code
ww: Week Code

Order Code	Package	Base QTY	Delivery Mode
UMW IRL540N	TO-220	1000	Tube and box



10.Disclaimer

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