

1. Description

The uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V.

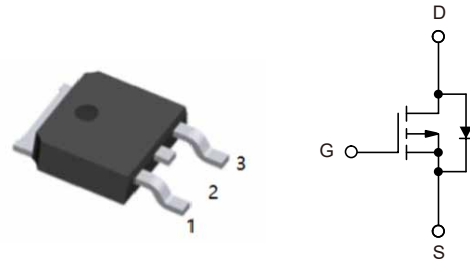
2. Features

- $V_{DS(V)} = -60V$
- $I_D = -10A (V_{GS} = -10V)$
- $R_{DS(ON)} < 110m\Omega (V_{GS} = -10V)$

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}	-60	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current, $V_{GS} @ -10V$ ¹	$T_C = 25^\circ C$	I_D	-10	A
Continuous Drain Current, $V_{GS} @ -10V$ ¹	$T_C = 100^\circ C$		-8	A
Continuous Drain Current, $V_{GS} @ -10V$ ¹	$T_A = 25^\circ C$		-9	A
Continuous Drain Current, $V_{GS} @ -10V$ ¹	$T_A = 70^\circ C$		-6.5	A
Pulsed Drain Current ²		I_{DM}	-36	A
Single Pulse Avalanche Energy ³		E_{AS}	25	mJ
Avalanche Current		I_{AS}	-26.6	A
Total Power Dissipation ¹	$T_C = 25^\circ C$	P_D	3	W
Total Power Dissipation ¹	$T_A = 25^\circ C$		2	W
Storage Temperature Range		T_J	-55 to 150	$^\circ C$
Operating Junction Temperature Range		T_{STG}	-55 to 150	$^\circ C$
Thermal Resistance Junction-Ambient ¹		$R_{\theta JA}$	42	$^\circ C/W$
Thermal Resistance Junction-Case ¹		$R_{\theta JC}$	3.6	$^\circ C/W$



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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	-60			V
BV_{DSS} Temperature Coefficient	$\Delta BV_{DSS}/\Delta T_J$	Referenced to $25^\circ\text{C}, I_D=-1\text{mA}$		-0.03		V/ $^\circ\text{C}$
Static Drain-Source On-Resistance	$R_{DS(ON)}$	$V_{DS}=-10V, I_D=-8A$		80	110	m Ω
		$V_{GS}=-4.5V, I_D=-5A$		95	157	m Ω
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.2	1.5	-2.5	V
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}$			4.56		mV/ $^\circ\text{C}$
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=-48V, V_{GS}=0V, T_J=25^\circ\text{C}$			1	μA
		$V_{DS}=-48V, V_{GS}=0V, T_J=55^\circ\text{C}$			5	μA
Gate-Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			± 100	nA
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-12A$		15.4		S
Gate Resistance	R_g	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$		13.5		Ω
Total Gate Charge (-4.5V)	Q_g	$V_{DS}=-48V, I_D=-10A$ $V_{GS}=-4.5V$		9.86		nC
Gate-Source Charge	Q_{gs}			3.08		nC
Gate-Drain Charge	Q_{gd}			2.95		nC
Turn-On Delay Time	$t_{D(on)}$	$V_{DD}=-15V, I_D=-1A$ $V_{GS}=-10V, R_G=3.3\Omega$		28.8		ns
Rise Time	t_r			19.8		ns
Turn-Off Delay Time	$t_{D(off)}$			60.8		ns
Fall Time	t_f			7.2		ns
Input Capacitance	C_{iss}	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$		800		pF
Output Capacitance	C_{oss}			97.3		pF
Reverse Transfer Capacitance	C_{rss}			70		pF
Continuous Source Current ^{1,5}	I_S	$V_G=V_D=0V, \text{Force Current}$			-18	A
Pulsed Source Current ^{2,5}	I_{SM}				-36	A
Diode Forward Voltage ²	V_{SD}	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$			-1.2	V



Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- 3.The EAS data shows Max. rating . The test condition is $V_{\text{DD}}=-25\text{V}$, $V_{\text{GS}}=-10\text{V}$, $L=0.1\text{mH}$, $I_{\text{AS}}=-26.6\text{A}$.
- 4.The power dissipation is limited by 150°C junction temperature.
- 5.The data is theoretically the same as I_{D} and I_{DM} , in real applications , should be limited by total power dissipation.



7.1Typical Characteristics

Figure 1: Typical Output Characteristics	Figure 2: On-Resistance v.s Gate-Source
Figure 3: Forward Characteristics of Reverse	Figure 4: Gate-Charge Characteristics
Figure 5: Normalized $V_{GS(th)}$ v.s T_J	Figure 6: Normalized $R_{DS(ON)}$ v.s T_J



7.2 Typical Characteristics

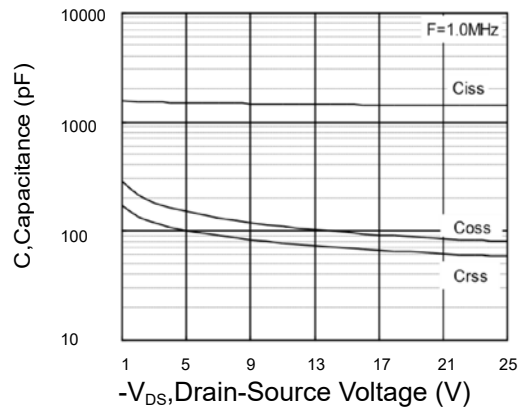


Figure 7: Capacitance

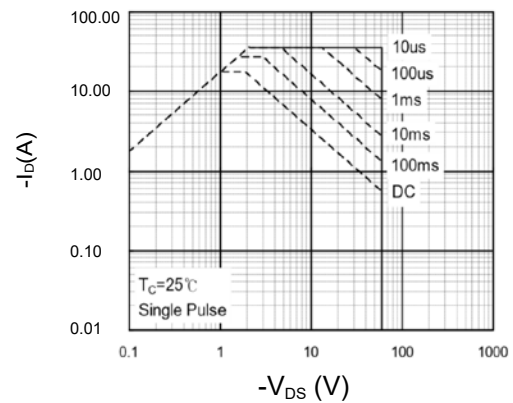


Figure 8: Safe Operating Area

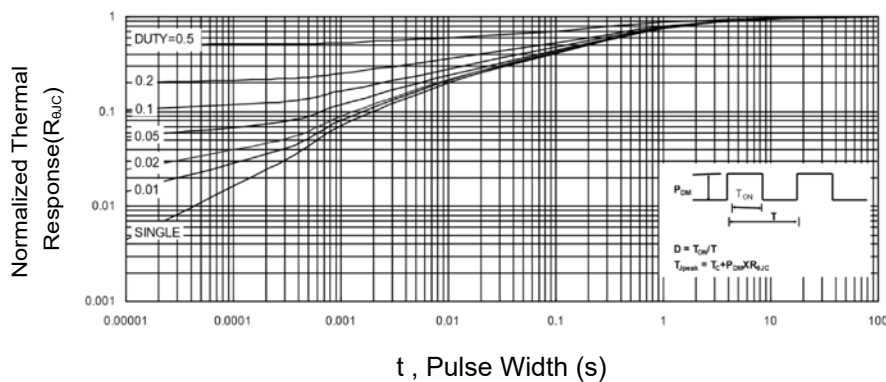


Figure 9: Normalized Maximum Transient Thermal Impedance

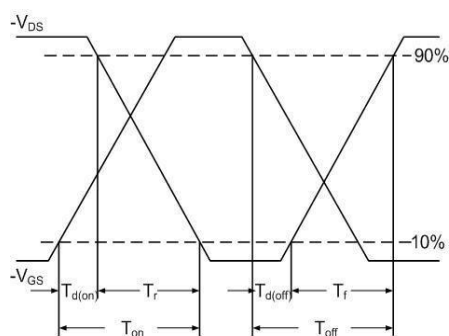


Figure 10: Switching Time Waveform

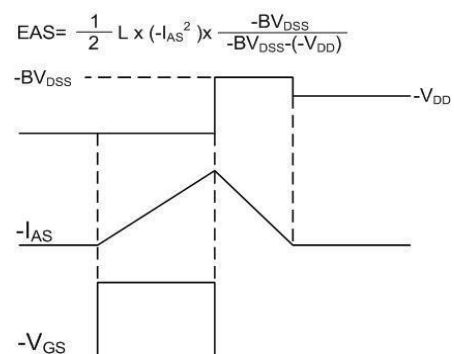
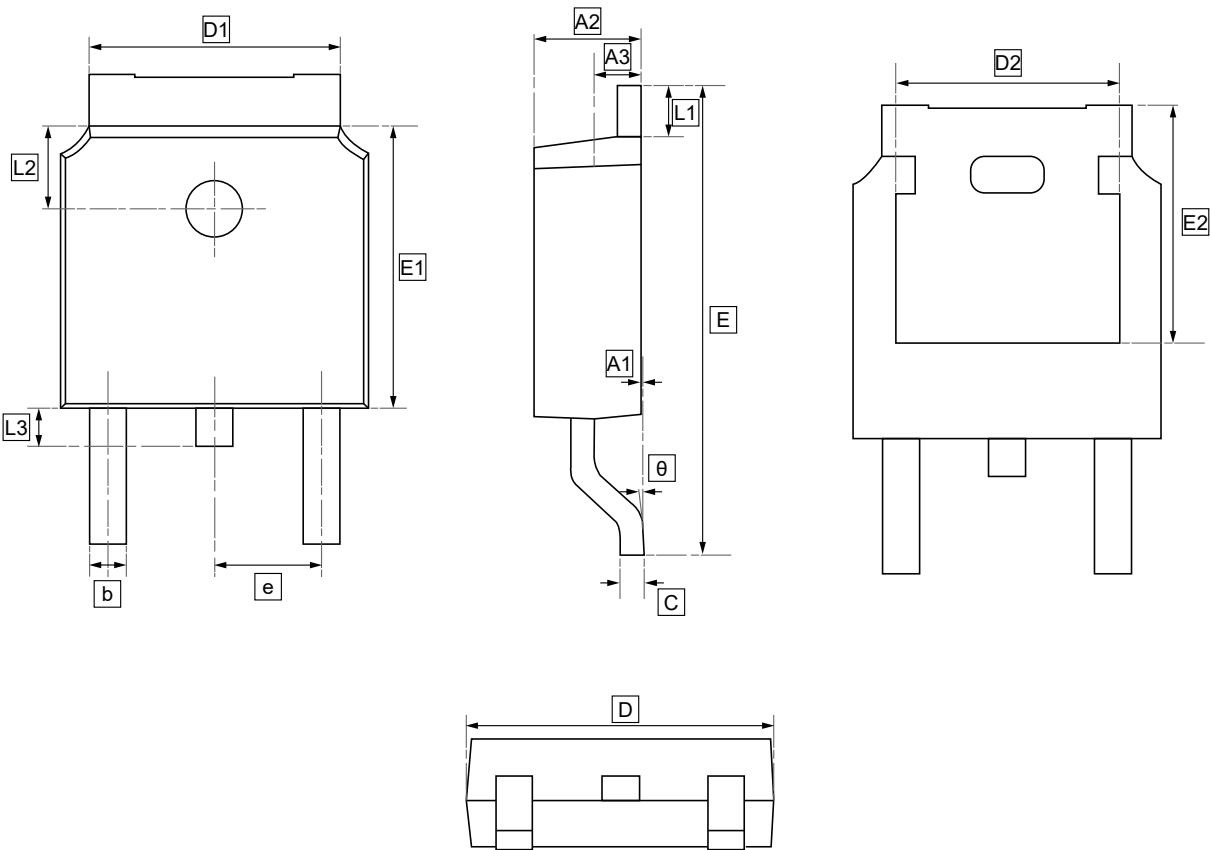


Figure 11: Unclamped Inductive Waveform



8.TO-252 Package Outline Dimensions

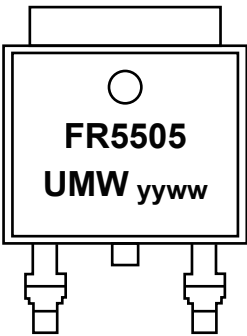


DIMENSIONS (mm are the original dimensions)

Symbol	A1	A2	A3	b	c	D	D1	D2	E	E1	E2	e	L1	L2	L3	θ
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 BSC	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		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 IRFR5505TR	TO-252	2500	Tape and reel



10.Disclaimer

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