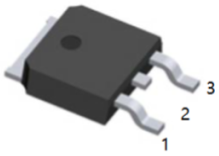
IRLR7843

30V N-Channel MOSFET

Applications

- High Frequency Synchronous Buck Converters for Computer Processor Power

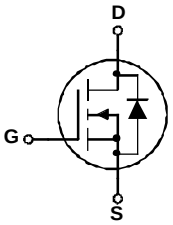


1.G 2.D 3.S

TO-252(DPAK) top view

Benefits

- Very Low RDS(on) at 4.5V V_{GS}
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current



- V_{DS}(V) = 30V
- $R_{DS(ON)}$ < 3.3mΩ (V_{GS} = 10V)
- Qg =34nC

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	161④	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	113④	
I_{DM}	Pulsed Drain Current ①	620	
P_D @T_C = 25°C	Maximum Power Dissipation ⑤	140	W
P_D @T_C = 100°C	Maximum Power Dissipation ⑤	71	
	Linear Derating Factor	0.95	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds	300 (1.6mm from case)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case		1.05	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ⑤		50	
$R_{\theta JA}$	Junction-to-Ambient		110	

Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30			V	V_{GS} = 0V, I_D = 250μA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient		19		mV/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance		2.6	3.3	mΩ	V_{GS} = 10V, I_D = 15A ③
			3.2	4.0		V_{GS} = 4.5V, I_D = 12A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.0		2.5	V	V_{DS} = V_{GS}, I_D = 250μA
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Coefficient		-5.4		mV/°C	
I_{DSS}	Drain-to-Source Leakage Current			1.0	μA	V_{DS} = 24V, V_{GS} = 0V
				150		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage			100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage			-100		V_{GS} = -20V
gfs	Forward Transconductance	37			S	V_{DS} = 15V, I_D = 12A
Q_g	Total Gate Charge		34	50		
Q_{gs1}	Pre-Vth Gate-to-Source Charge		9.1			V_{DS} = 15V
Q_{gs2}	Post-Vth Gate-to-Source Charge		2.5		nC	V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge		12			I_D = 12A
Q_{godr}	Gate Charge Overdrive		10			See Fig. 16
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})		15			
Q_{oss}	Output Charge		21		nC	V_{DS} = 15V, V_{GS} = 0V
$t_{d(on)}$	Turn-On Delay Time		25			V_{DD} = 15V, V_{GS} = 4.5V③
t_r	Rise Time		42			I_D = 12A
$t_{d(off)}$	Turn-Off Delay Time		34		ns	Clamped Inductive Load
t_f	Fall Time		19			
C_{iss}	Input Capacitance		4380			V_{GS} = 0V
C_{oss}	Output Capacitance		940		pF	V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance		430			f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②		1440	mJ
I_{AR}	Avalanche Current ①		12	A
E_{AR}	Repetitive Avalanche Energy ①		14	mJ

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)			161④	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ①			620		
V_{SD}	Diode Forward Voltage			1.0	V	T_J = 25°C, I_S = 12A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time		39	59	ns	T_J = 25°C, I_F = 12A, V_{DD} = 15V
Q_{rr}	Reverse Recovery Charge		36	54	nC	di/dt = 100A/μs ③
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

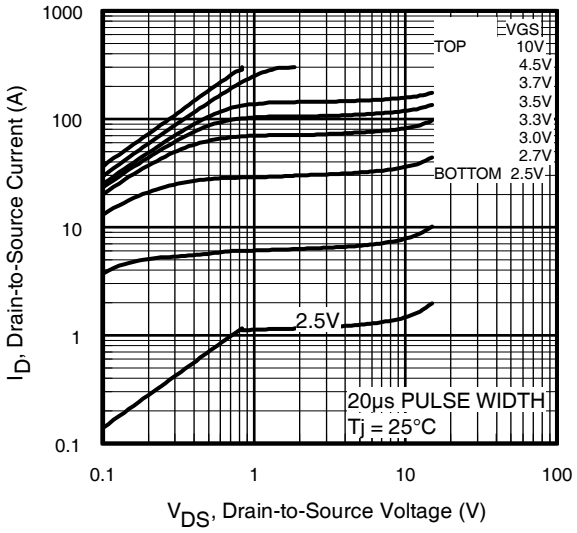


Fig 1. Typical Output Characteristics

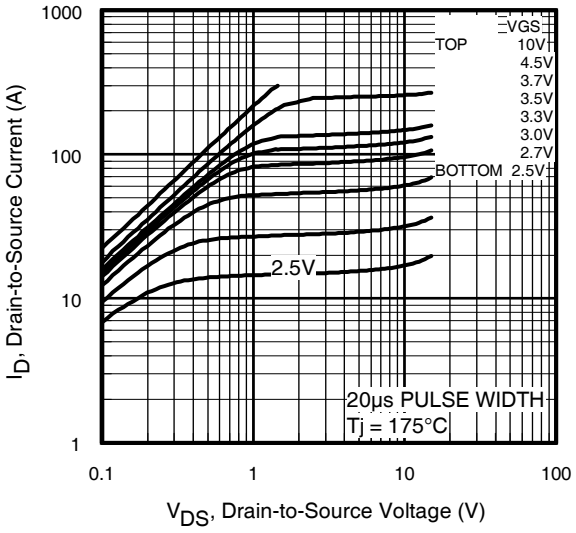


Fig 2. Typical Output Characteristics

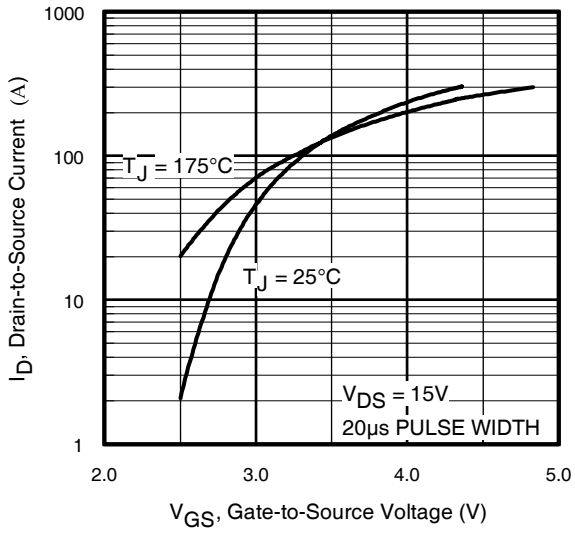


Fig 3. Typical Transfer Characteristics

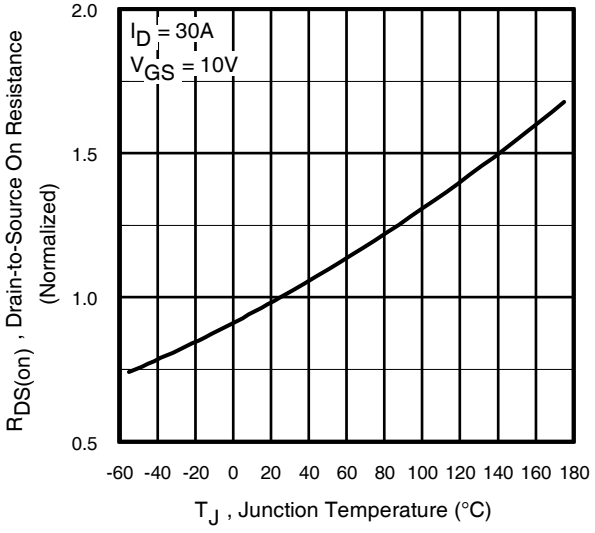


Fig 4. Normalized On-Resistance vs. Temperature

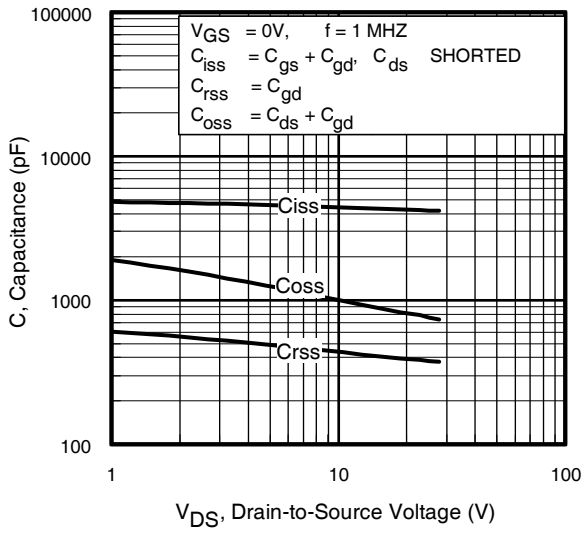


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

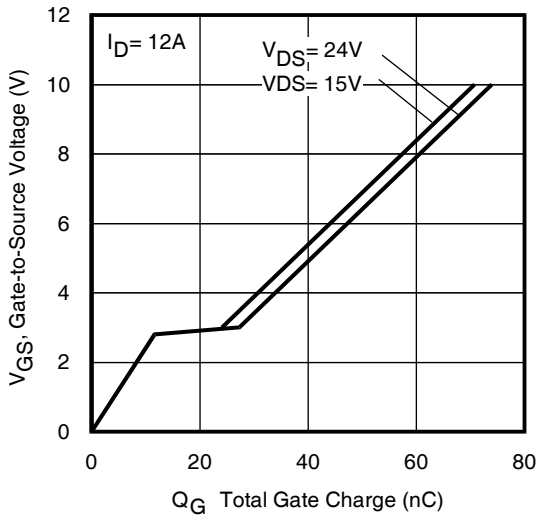


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

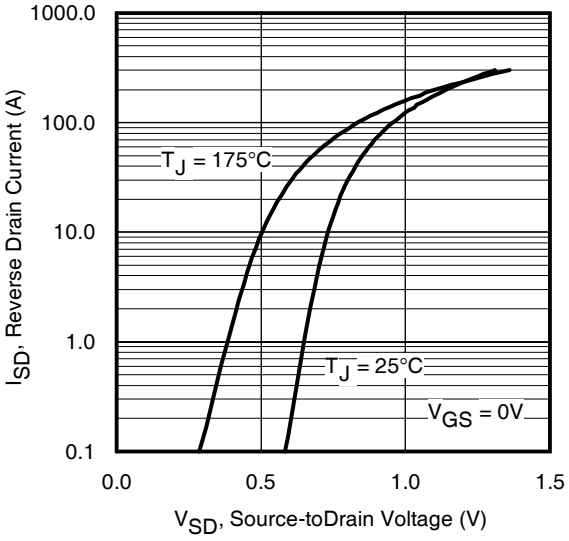


Fig 7. Typical Source-Drain Diode Forward Voltage

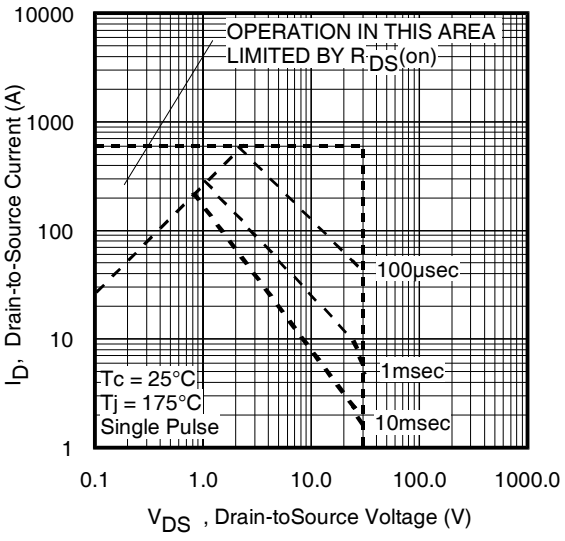


Fig 8. Maximum Safe Operating Area

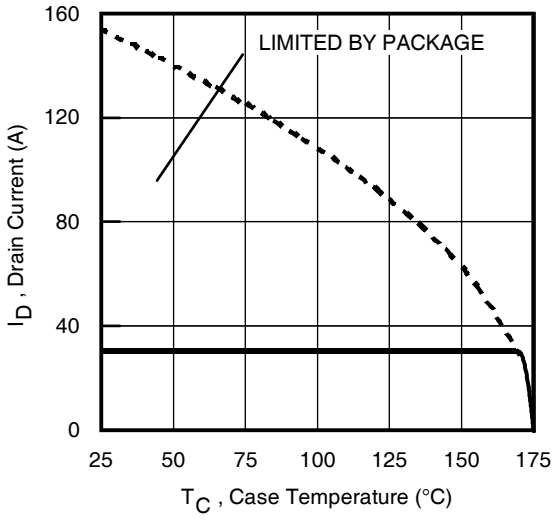


Fig 9. Maximum Drain Current vs. Case Temperature

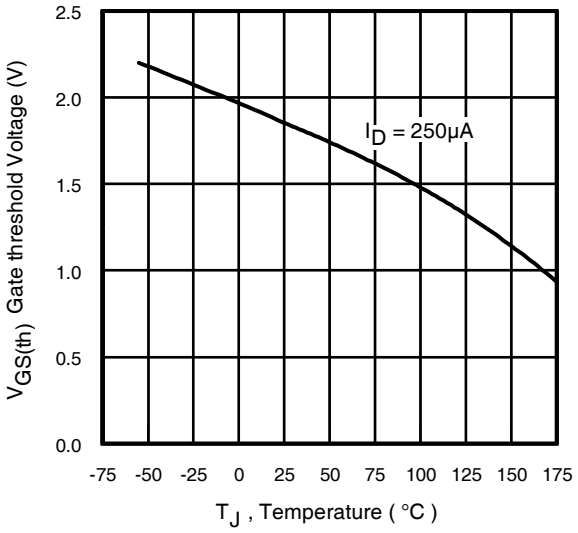


Fig 10. Threshold Voltage vs. Temperature

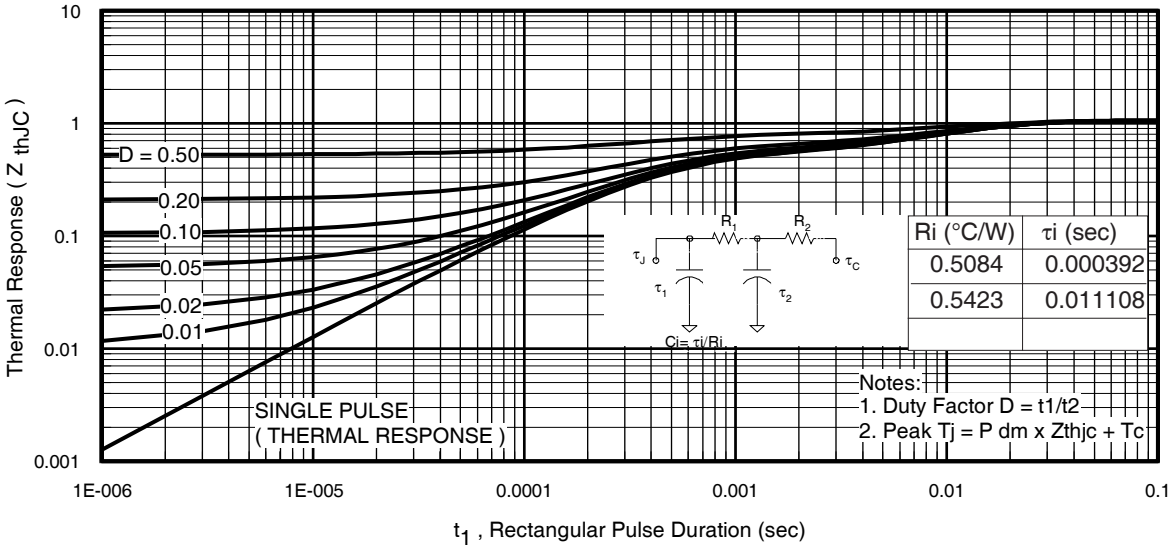


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

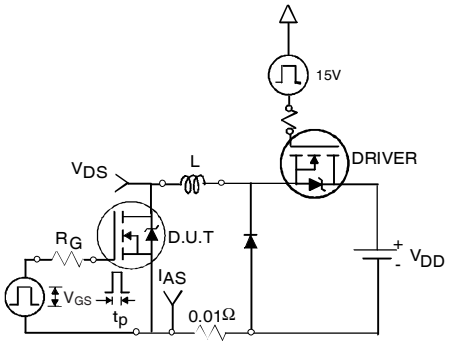


Fig 12a. Unclamped Inductive Test Circuit

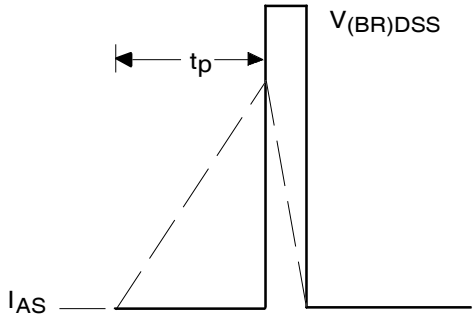


Fig 12b. Unclamped Inductive Waveforms

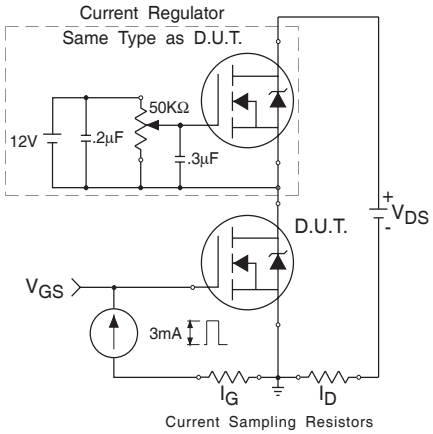


Fig 13. Gate Charge Test Circuit

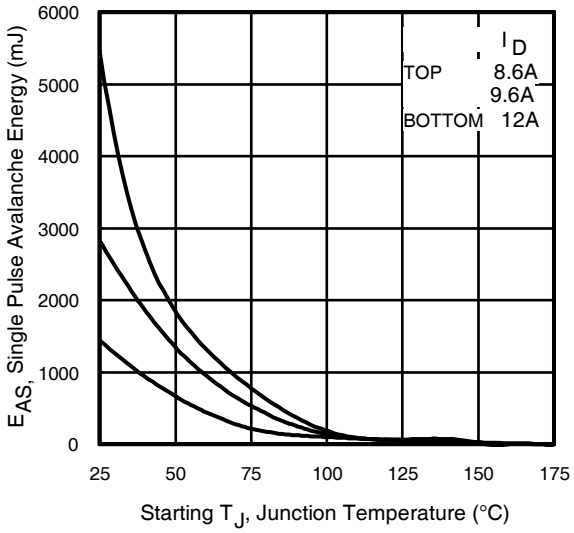


Fig 12c. Maximum Avalanche Energy Vs. Drain Current

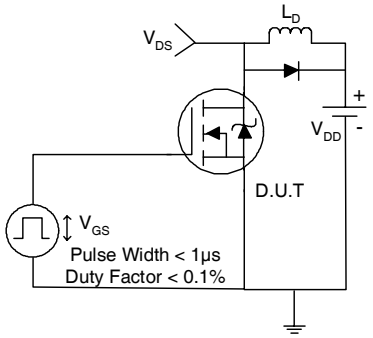


Fig 14a. Switching Time Test Circuit

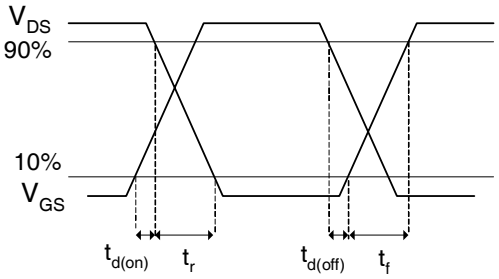
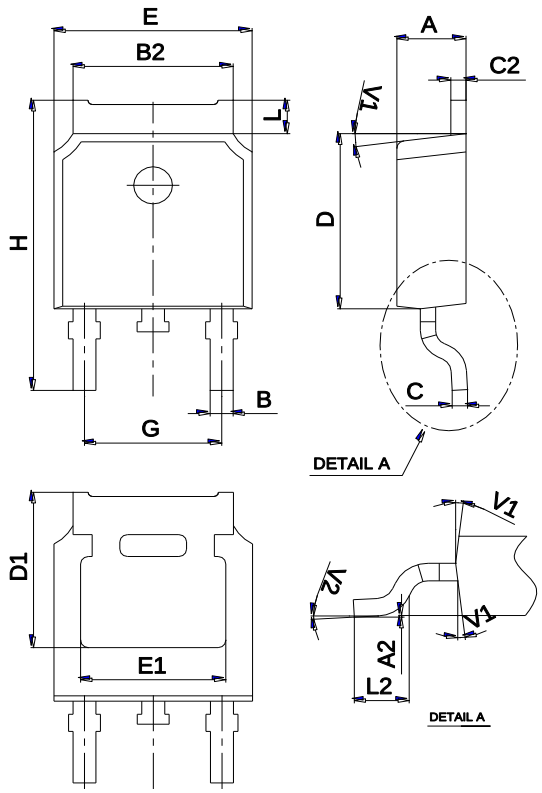


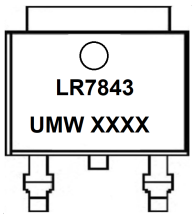
Fig 14b. Switching Time Waveforms

Package Mechanical Data TO-252



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	2.10		2.50	0.083		0.098
A2	0		0.10	0		0.004
B	0.66		0.86	0.026		0.034
B2	5.18		5.48	0.202		0.216
C	0.40		0.60	0.016		0.024
C2	0.44		0.58	0.017		0.023
D	5.90		6.30	0.232		0.248
D1	5.30REF			0.209REF		
E	6.40		6.80	0.252		0.268
E1	4.63			0.182		
G	4.47		4.67	0.176		0.184
H	9.50		10.70	0.374		0.421
L	1.09		1.21	0.043		0.048
L2	1.35		1.65	0.053		0.065
V1		7°			7°	
V2	0°		6°	0°		6°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRLR7843TR	TO-252	2500	Tape and reel