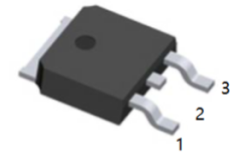## Features

- $V_{DS (V)}=30V$
- $R_{DS(ON)} < 5.8m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 8 m\Omega$ ($V_{GS} = 4.5V$)

Applications

- High Frequency Synchronous Buck Converters for Computer Processor Power
- High Frequency Isolated DC-DC Converters with Synchronous Rectification for Telecom and Industrial Use

Benefits

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

1.G 2.D 3.S
TO-252(DPAK) top view

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	86④	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	61④	
I_{DM}	Pulsed Drain Current ①	340	
P_D @T_C = 25°C	Maximum Power Dissipation ⑥	75	W
P_D @T_C = 100°C	Maximum Power Dissipation ⑥	38	
	Linear Derating Factor	0.5	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 ⑥		2.0	°C/W
$R_{\theta JA}$	Junction-to-Ambient (PCB Mount) ⑤		50	
$R_{\theta JA}$	Junction-to-Ambient		110	

Notes

① Repetitive rating; pulse width limited by max. junction temperature.
② Starting T_J = 25°C, L = 0.605mH, R_G = 25Ω, I_{AS} = 20A.
③ Pulse width ≤ 400µs; duty cycle ≤ 2%.
④ Calculated continuous current based on maximum allowable junction temperature. Package limitation current is 50A.
⑤ When mounted on 1" square PCB (FR-4 or G-10 Material).For recommended footprint and soldering techniques refer to application note #AN-994.
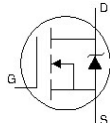⑥ R_θ is measured at T_J approximately at 90°C

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
ΔBV$_{DSS}$/ΔT$_J$	Breakdown Voltage Temp. Coefficient		20		mV/°C	Reference to 25°C, I$_D$ = 1mA
R$_{DS(on)}$	Static Drain-to-Source On-Resistance		4.0	5.8	mΩ	V$_{GS}$ = 10V, I$_D$ = 25A ③
			5.8	8.0		V$_{GS}$ = 4.5V, I$_D$ = 20A ③
V$_{GS(th)}$	Gate Threshold Voltage	1.35	1.80	2.35	V	V$_{DS}$ = V$_{GS}$, I$_D$ = 50µA
ΔV$_{GS(th)}$/ΔT$_J$	Gate Threshold Voltage Coefficient		-8.6		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	73			S	V$_{DS}$ = 15V, I$_D$ = 20A
Q$_g$	Total Gate Charge		15	23		
Q$_{gs1}$	Pre-Vth Gate-to-Source Charge		3.7			V$_{DS}$ = 15V
Q$_{gs2}$	Post-Vth Gate-to-Source Charge		1.9		nC	V$_{GS}$ = 4.5V
Q$_{gd}$	Gate-to-Drain Charge		5.7			I$_D$ = 20A
Q$_{godr}$	Gate Charge Overdrive		3.7			See Fig. 15
Q$_{sw}$	Switch Charge (Q$_{gs2}$ + Q$_{gd}$)		7.6			
Q$_{oss}$	Output Charge		10		nC	V$_{DS}$ = 15V, V$_{GS}$ = 0V
R$_G$	Gate Resistance		2.0	3.5	Ω	
t$_{d(on)}$	Turn-On Delay Time		12			V$_{DD}$ = 15V, V$_{GS}$ = 4.5V③
t$_r$	Rise Time		49			I$_D$ = 20A
t$_{d(off)}$	Turn-Off Delay Time		15		ns	R$_G$ = 1.8Ω
t$_f$	Fall Time		16			See Fig. 13
C$_{iss}$	Input Capacitance		2150			V$_{GS}$ = 0V
C$_{oss}$	Output Capacitance		480		pF	V$_{DS}$ = 15V
C$_{rss}$	Reverse Transfer Capacitance		205			f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E$_{AS}$	Single Pulse Avalanche Energy②		120	mJ
I$_{AR}$	Avalanche Current ①		20	A

Diode Characteristics

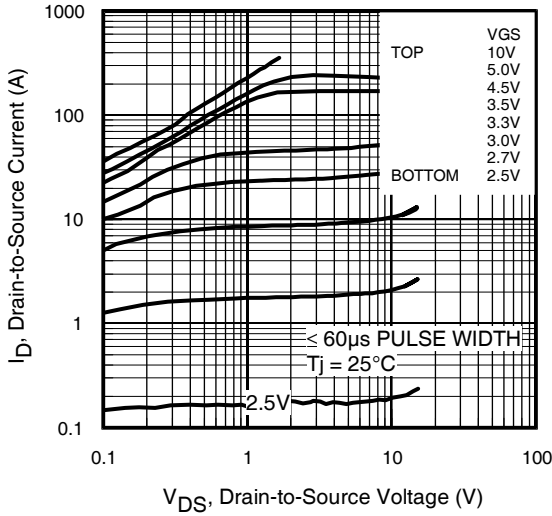|	Parameter	Min.	Typ.	Max.	Units	Conditions
I$_S$	Continuous Source Current (Body Diode)			86④	A	MOSFET symbol showing the integral reverse p-n junction diode.
I$_{SM}$	Pulsed Source Current (Body Diode) ①			340		
V$_{SD}$	Diode Forward Voltage			1.0	V	T$_J$ = 25°C, I$_S$ = 20A, V$_{GS}$ = 0V ③
t$_{rr}$	Reverse Recovery Time		24	36	ns	T$_J$ = 25°C, I$_F$ = 20A, V$_{DD}$ = 15V
Q$_{rr}$	Reverse Recovery Charge		52	78	nC	di/dt = 300A/µs ③

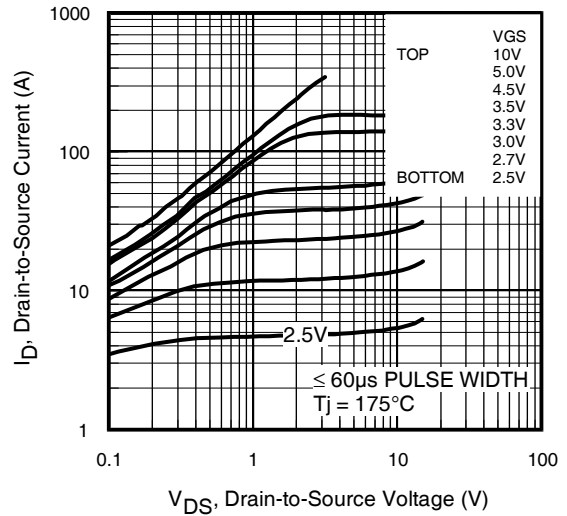**Fig 1.** Typical Output Characteristics

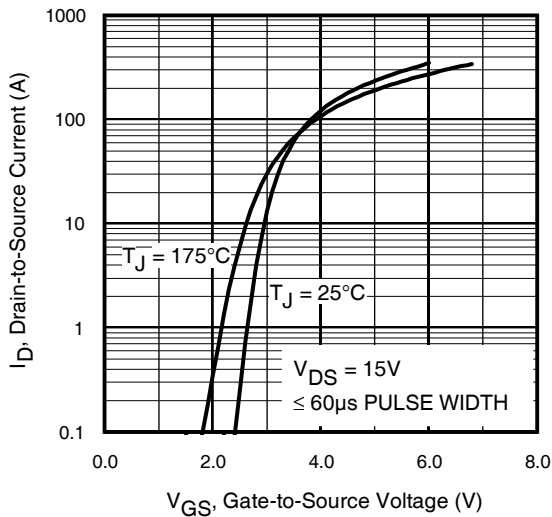**Fig 2.** Typical Output Characteristics

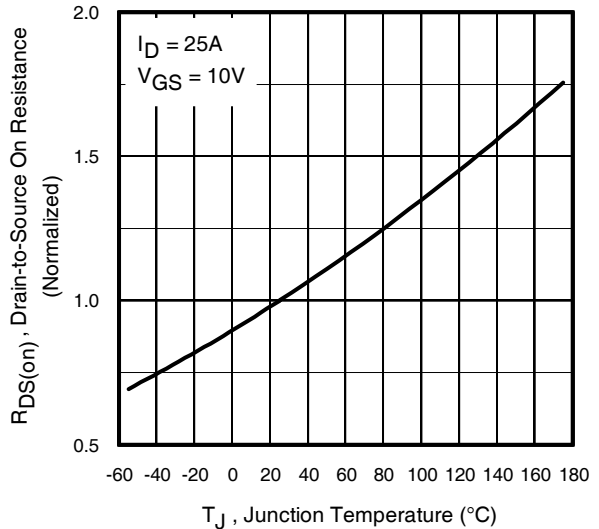**Fig 3.** Typical Transfer Characteristics

Fig 4. Normalized On-Resistance
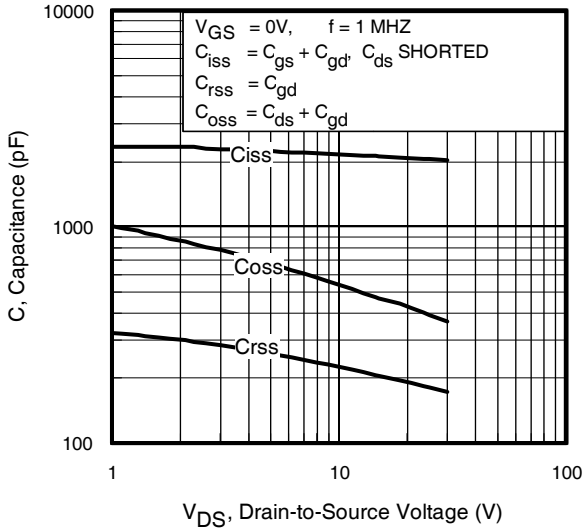vs. Temperature

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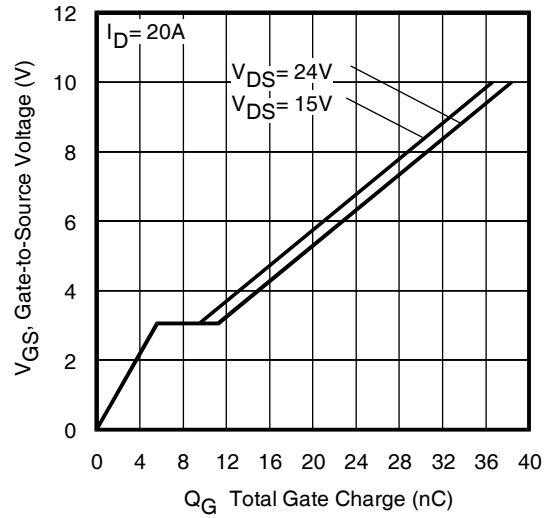Drain-to-Source Voltage

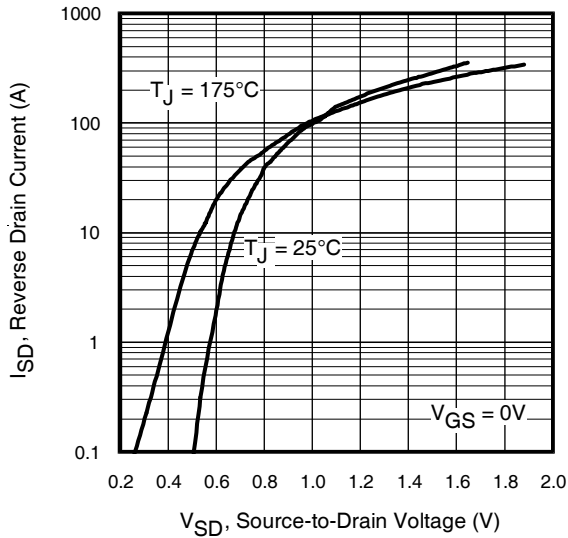**Fig 6.** Typical Gate Charge vs.
Gate-to-Source Voltage

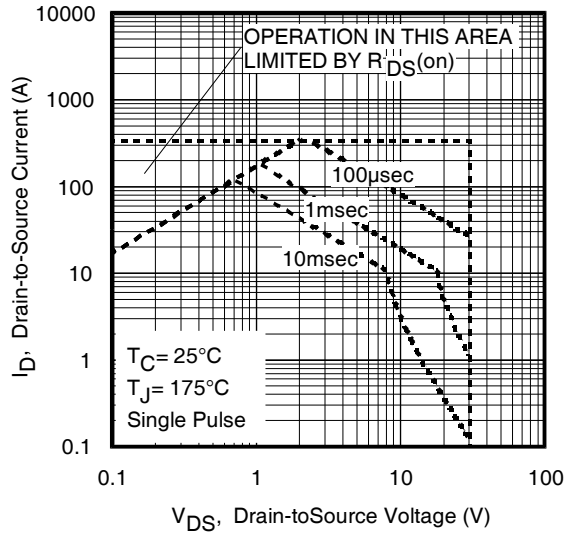**Fig 7.** Typical Source-Drain Diode
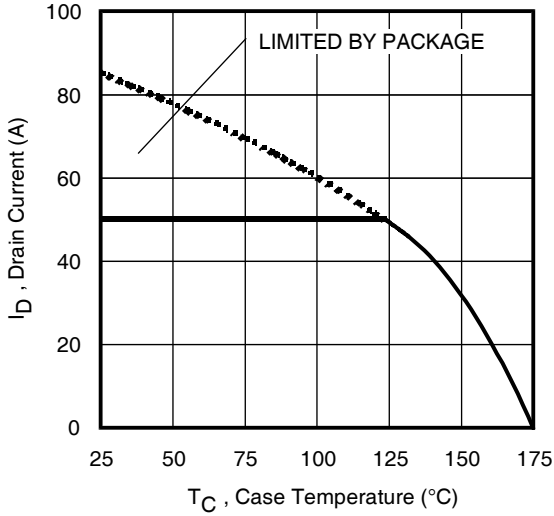Forward Voltage

Fig 8. Maximum Safe Operating Area
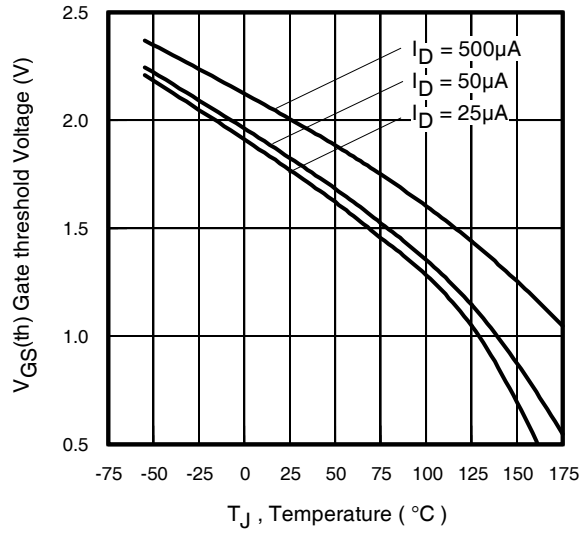
Fig 9. Maximum Drain Current vs. Case Temperature
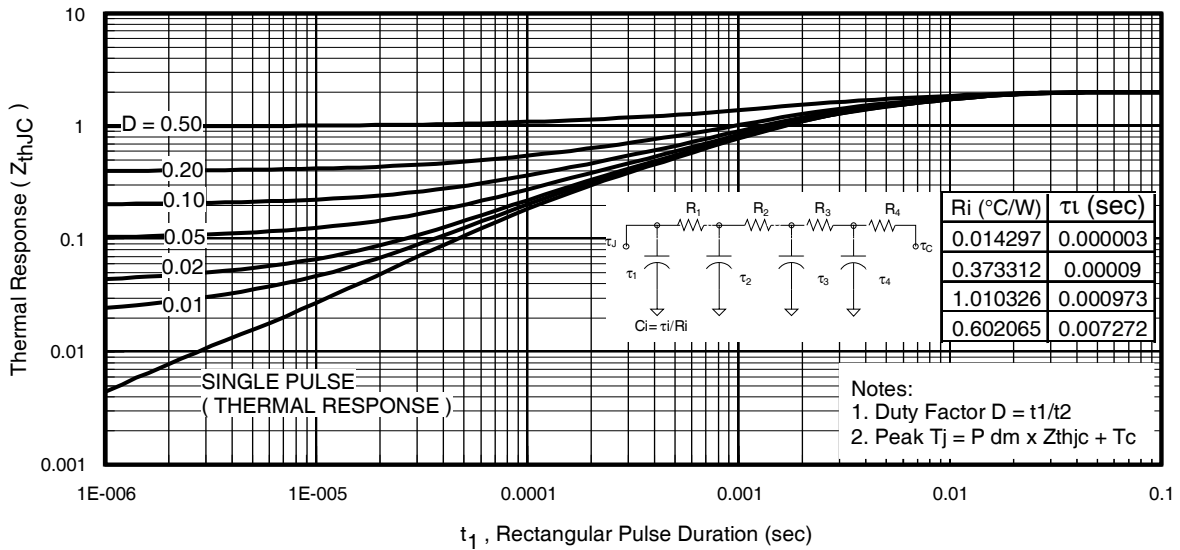

Fig 10. Threshold Voltage vs. Temperature

Ri (°C/W)	$\tau\iota$ (sec)
0.014297	0.000003
0.373312	0.00009
1.010326	0.000973
0.602065	0.007272

Notes:
1. Duty Factor D = t1/t2
2. Peak Tj = P dm x Zthjc + Tc

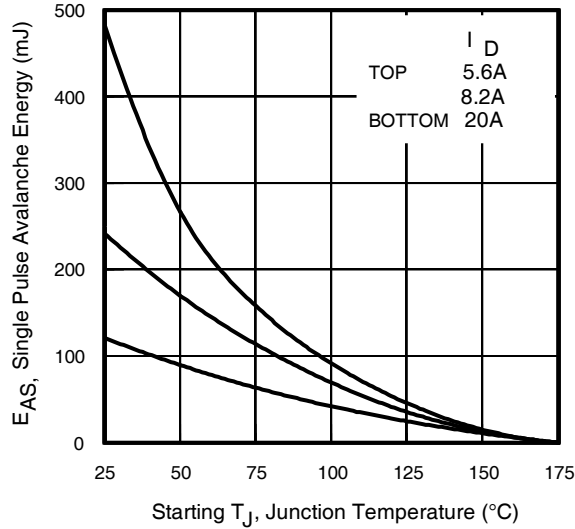**Fig 11.** Maximum Effective Transient Thermal Impedance, Junction-to-Case

Fig 12a. Maximum Avalanche Energy
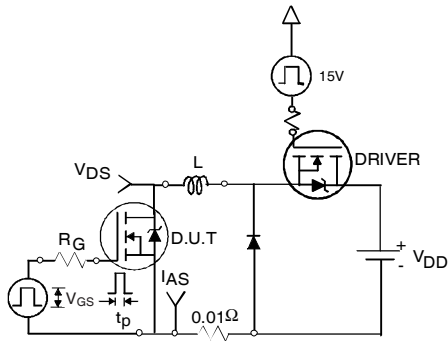Vs. Drain Current
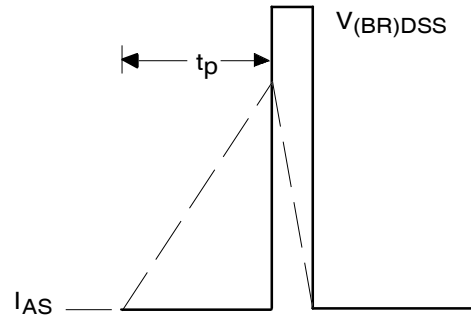

Fig 12b. Unclamped Inductive Test Circuit

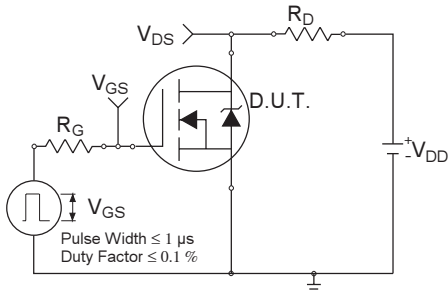**Fig 12c.** Unclamped Inductive Waveforms

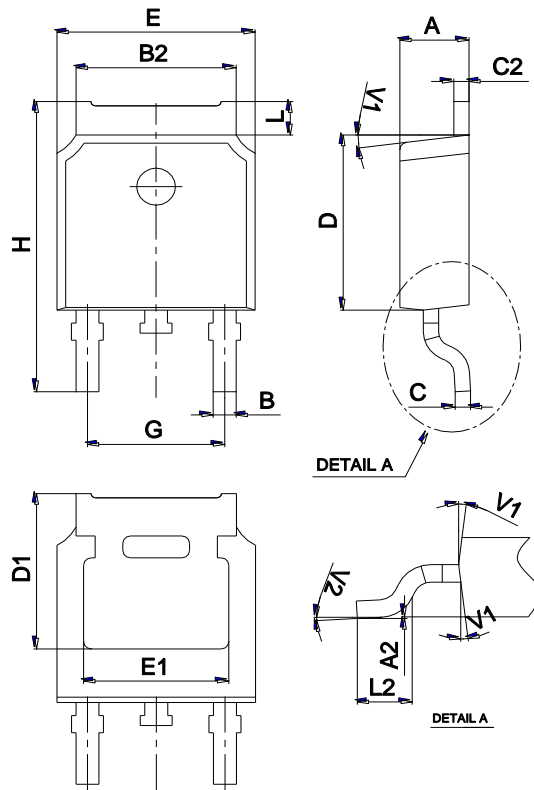**Fig 13a.** Switching Time Test Circuit
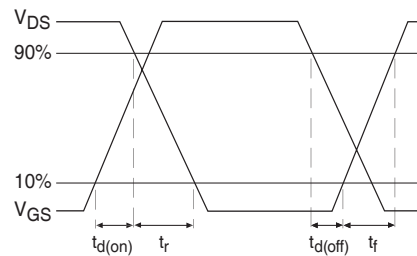
Fig 13b. Switching Time Waveforms

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
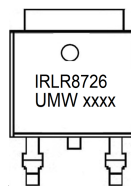
Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRLR8726TR	TO-252	2500	Tape and reel

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