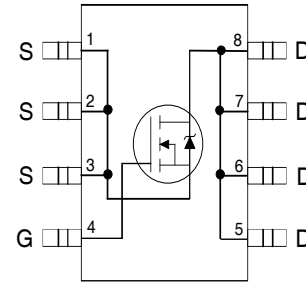


Description

The IRF8788TR has been optimized for parameters that are critical in synchronous buck operation including $R_{ds(on)}$ and gate charge to reduce both conduction and switching losses. The reduced total losses make this product ideal for high efficiency DC-DC converters that power the latest generation of processors for notebook and Netcom applications.



Top View

Benefits

- $V_{DS(V)} = 30V$
- $I_D = 24A$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 2.8m\Omega$ ($V_{GS} = 10V$)
- $R_{DS(ON)} < 3.8m\Omega$ ($V_{GS} = 4.5V$)
- Very Low Gate Charge
- Very Low $R_{DS(on)}$ at 4.5V V_{GS}
- Ultra-Low Gate Impedance
- Fully Characterized Avalanche Voltage and Current
- 20V V_{GS} Max. Gate Rating

Applications

- Synchronous MOSFET for Notebook Processor Power
- Synchronous Rectifier MOSFET for Isolated DC-DC Converters

Absolute Maximum Ratings

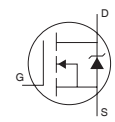
	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	24	A
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	19	
I_{DM}	Pulsed Drain Current ①	190	
$P_D @ T_A = 25^\circ C$	Power Dissipation	2.5	W
$P_D @ T_A = 70^\circ C$	Power Dissipation	1.6	
	Linear Derating Factor	0.02	
T_J	Operating Junction and	-55 to + 150	$^\circ C$
T_{STG}	Storage Temperature Range		

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JL}$	Junction-to-Drain Lead ⑤		20	$^\circ C/W$
$R_{\theta JA}$	Junction-to-Ambient ④⑤		50	

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		0.024		V/°C	Reference to 25°C, I _D = 1mA
R _{DS(on)}	Static Drain-to-Source On-Resistance		2.3	2.8	mΩ	V _{GS} = 10V, I _D = 24A ③
			3.04	3.8		V _{GS} = 4.5V, I _D = 19A ③
V _{GS(th)}	Gate Threshold Voltage	1.35	1.80	2.35	V	V _{DS} = V _{GS} , I _D = 100μA
ΔV _{GS(th)}	Gate Threshold Voltage Coefficient		-6.59		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
g _{fs}	Forward Transconductance	95			S	V _{DS} = 15V, I _D = 19A
Q _g	Total Gate Charge		44	66	nC	V _{DS} = 15V V _{GS} = 4.5V I _D = 19A See Figs. 17a & 17b
Q _{gs1}	Pre-V _{th} Gate-to-Source Charge		12			
Q _{gs2}	Post-V _{th} Gate-to-Source Charge		4.7			
Q _{gd}	Gate-to-Drain Charge		14			
Q _{godr}	Gate Charge Overdrive		13.3			
Q _{sw}	Switch Charge (Q _{gs2} + Q _{gd})		18.7			
Q _{oss}	Output Charge		22		nC	V _{DS} = 16V, V _{GS} = 0V
R _g	Gate Resistance		0.54	1.09	Ω	
t _{d(on)}	Turn-On Delay Time		23		ns	V _{DD} = 15V, V _{GS} = 4.5V I _D = 19A R _G = 1.8Ω See Fig. 15a & 15b
t _r	Rise Time		24			
t _{d(off)}	Turn-Off Delay Time		23			
t _f	Fall Time		11			
C _{iss}	Input Capacitance		5720		pF	V _{GS} = 0V V _{DS} = 15V f = 1.0MHz
C _{oss}	Output Capacitance		980			
C _{riss}	Reverse Transfer Capacitance		450			
I _S	Continuous Source Current (Body Diode)			3.1	A	MOSFET symbol showing the integral reverse p-n junction diode.
I _{SM}	Pulsed Source Current (Body Diode) ①			190	A	
V _{SD}	Diode Forward Voltage			1.0	V	T _J = 25°C, I _S = 19A, V _{GS} = 0V ③
				0.75	V	T _J = 25°C, I _S = 2.2A, V _{GS} = 0V ③
t _{rr}	Reverse Recovery Time		24	36	ns	T _J = 25°C, I _F = 19A, V _{DD} = 15V
Q _{rr}	Reverse Recovery Charge		33	50	nC	di/dt = 230A/μs ③
t _{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				



Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E _{AS}	Single Pulse Avalanche Energy ②		230	mJ
I _{AR}	Avalanche Current ①		19	A

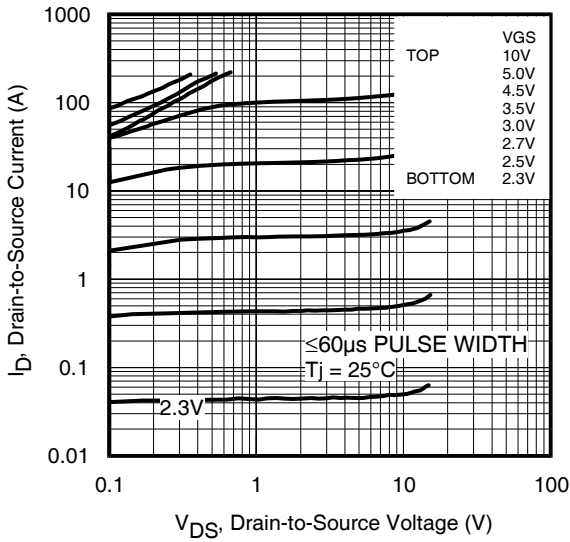


Fig 1. Typical Output Characteristics

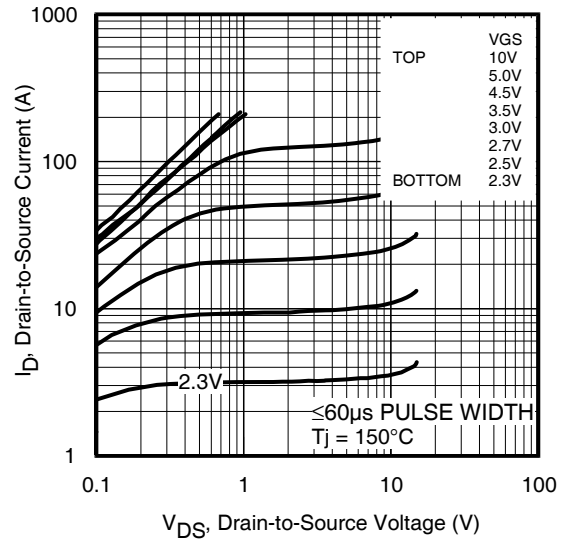


Fig 2. Typical Output Characteristics

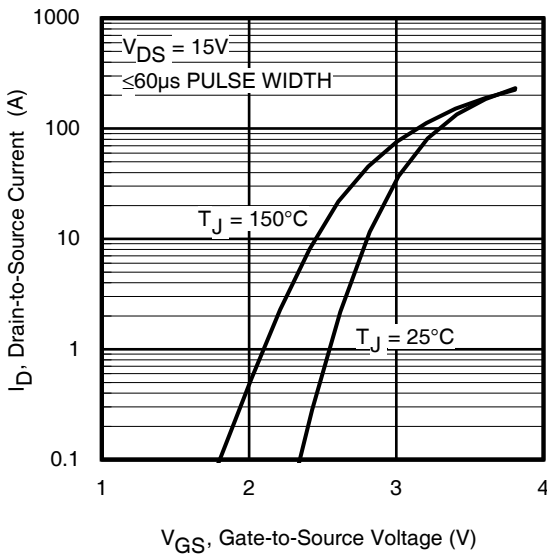


Fig 3. Typical Transfer Characteristics

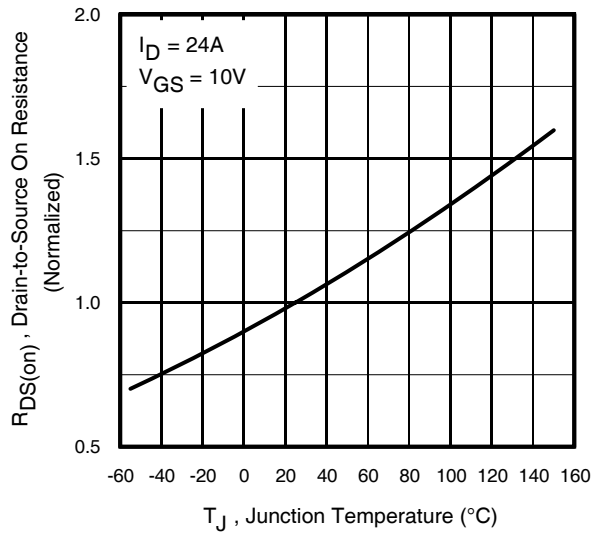


Fig 4. Normalized On-Resistance vs. Temperature

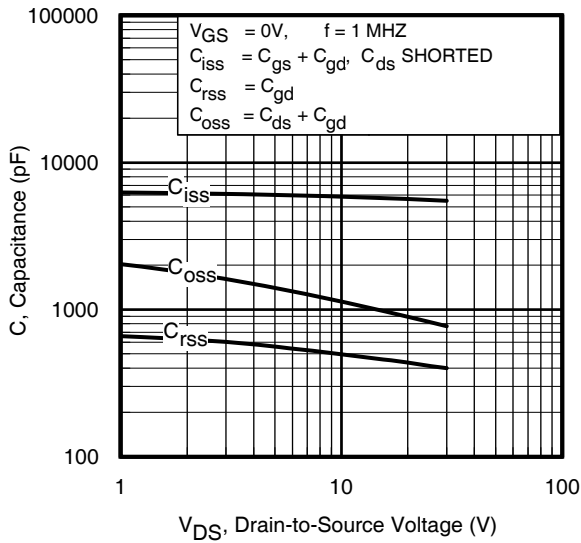


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

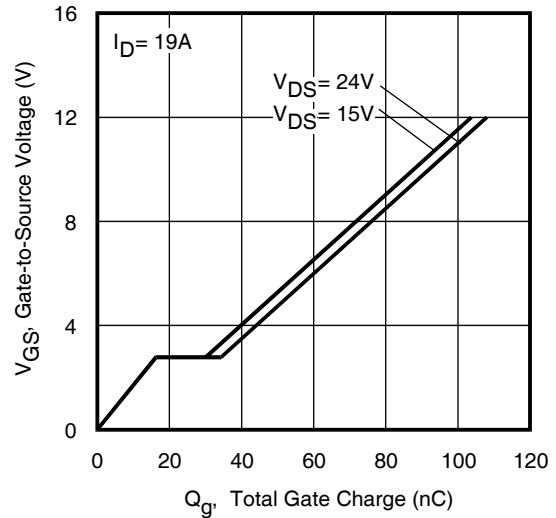


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

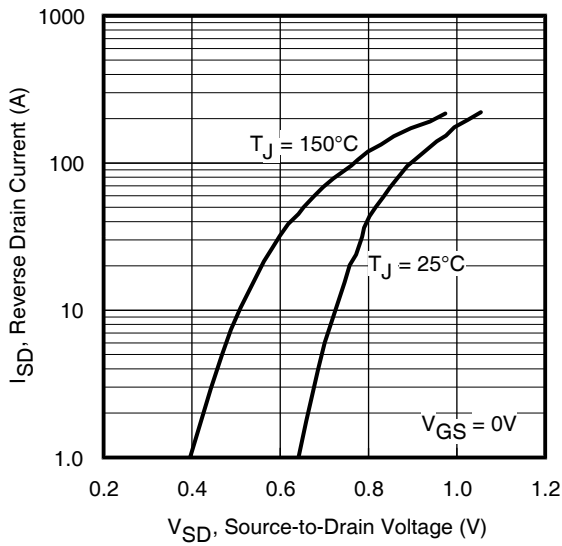


Fig 7. Typical Source-Drain Diode Forward Voltage

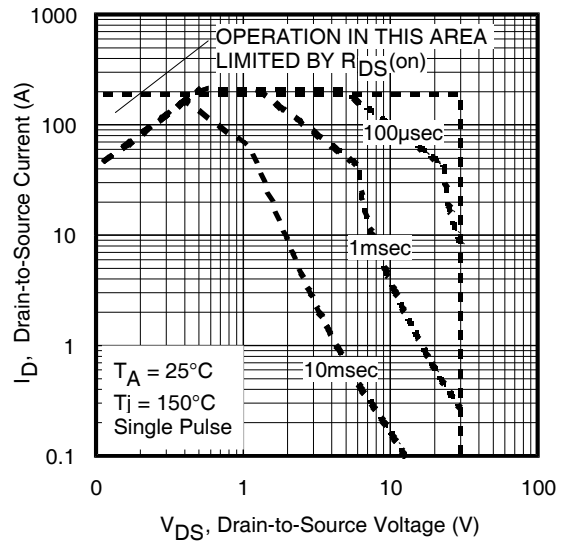


Fig 8. Maximum Safe Operating Area

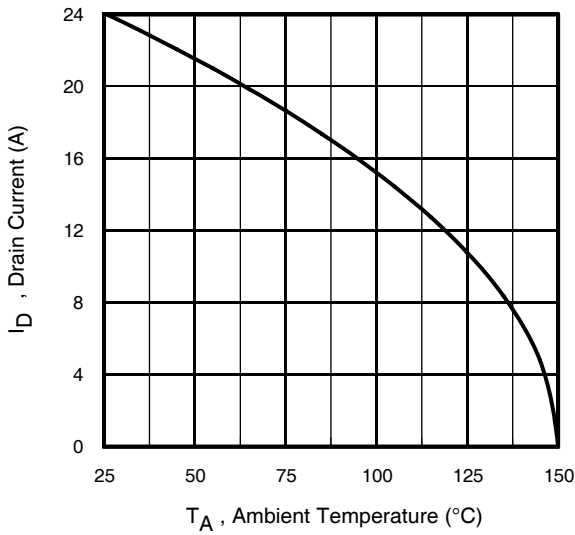


Fig 9. Maximum Drain Current vs. Ambient Temperature

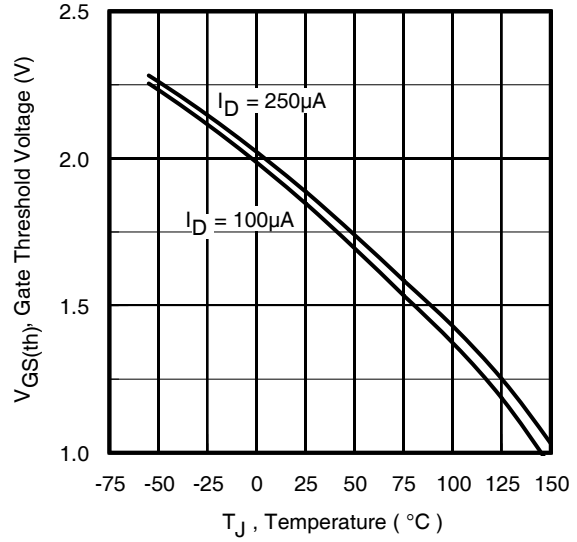


Fig 10. Threshold Voltage vs. Temperature

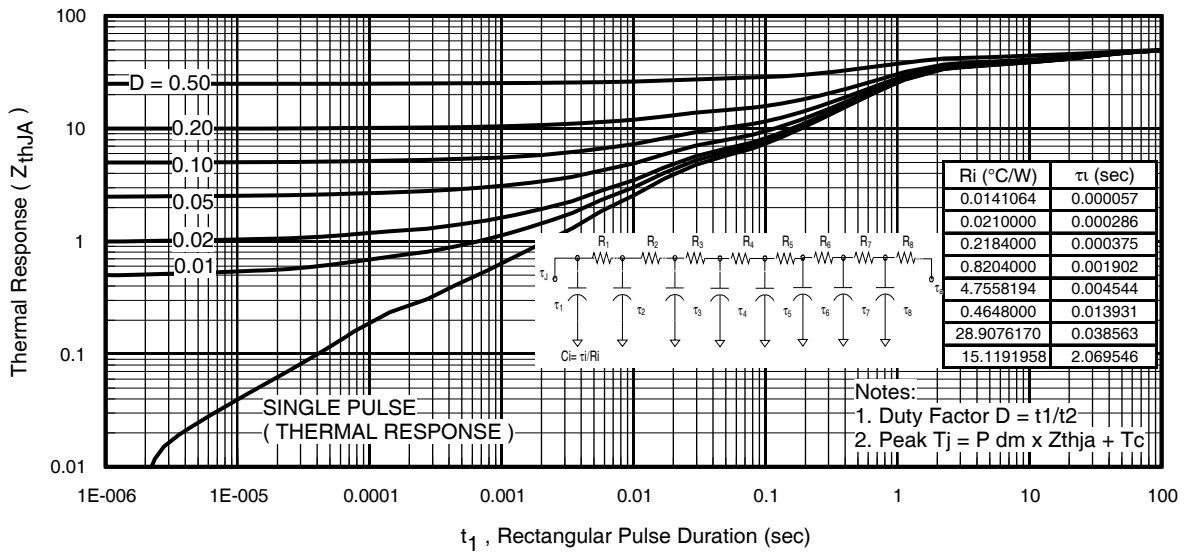


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

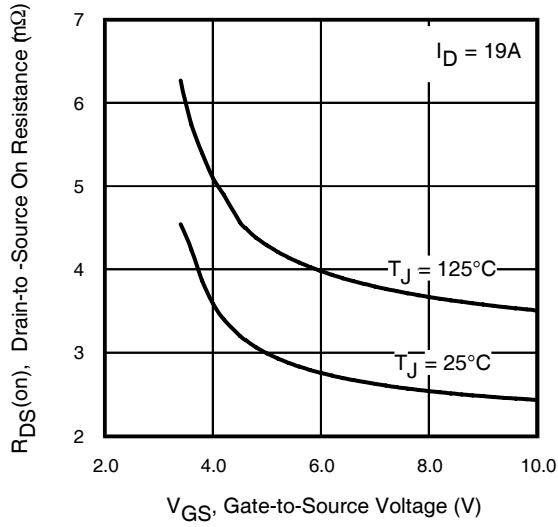


Fig 12. On-Resistance vs. Gate Voltage

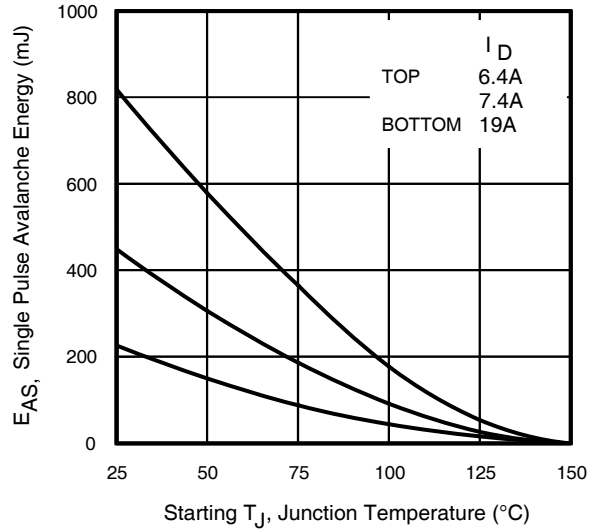
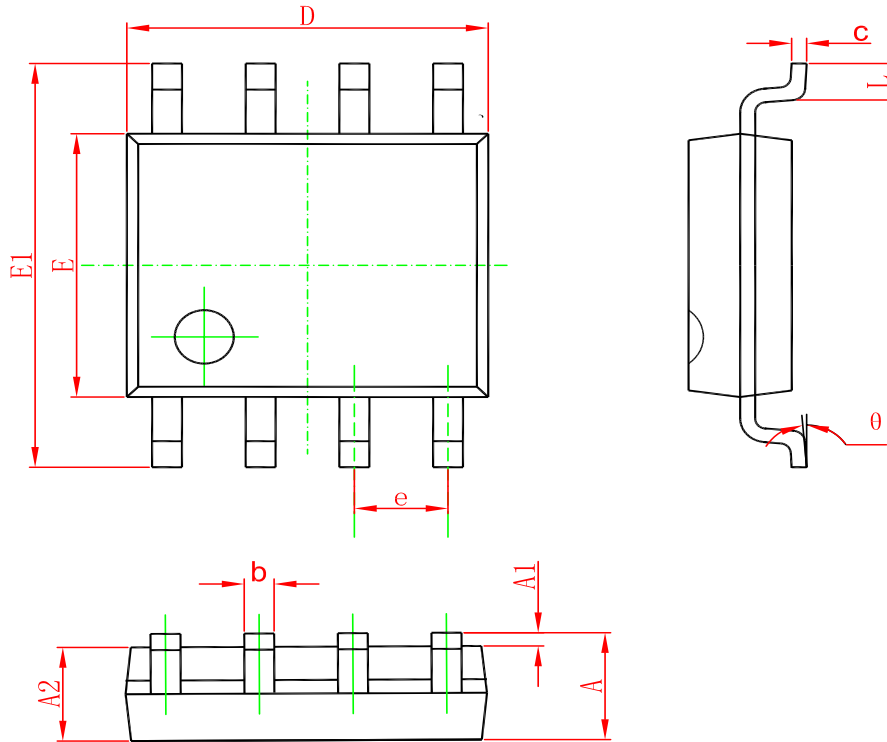


Fig 13. Maximum Avalanche Energy vs. Drain Current

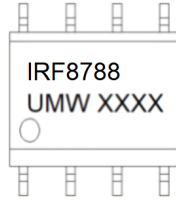
PACKAGE OUTLINE DIMENSIONS

SOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
theta	0°	8°	0°	8°

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW IRF8788TR	SOP-8	3000	Tape and reel