MT4805

Dual P-Channel Enhancement Mode Field Effect Transistor

-30V,-8A, 22mΩ

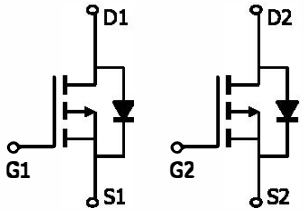
MT Semiconductor®

http://www.mtsemi.com

Features

- $R_{DS(on)}$ = 22 mΩ at V_{GS} = -10V, I_D= -8A
- Fast Switching Speed
- Low Gate Charge
- High Performance Trench Technology for Extr emely Low $R_{DS(on)}$
- High Power and Current Handling Capability
- RoHS Compliant

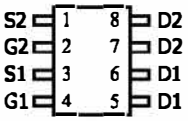
Simplified Schematic



General Description

This P-Channel MOSFET is produced using MOS-TECH Semiconductor's advanced PowerTrench process that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

MARKING DIAGRAM & PIN ASSIGNMENT



SO-8

Applications

- DC-DC primary bridge
- DC-DC Synchronous rectification
- Hot swap

MOSFET Maximum Ratings T_C = 25°C unless otherwise noted

Absolute Maximum Ratings T_A=25°C unless otherwise noted				
Parameter		**Symbol**	**Maximum**	**Units**
Drain-Source Voltage		V_{DS}	-30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current [A]	T_A=25°C	I_D	-8.0	A
	T_A=70°C		-6.2	
Pulsed Drain Current [B]		I_{DM}	-30	
Power Dissipation [A]	T_A=25°C	P_D	2	W
	T_A=70°C		1.28	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics					
Parameter		**Symbol**	**Typ**	**Max**	**Units**
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	48	62.5	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		74	110	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	35	40	°C/W

Electrical Characteristics (T_J=25°C unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
STATIC PARAMETERS						
BV_{DSS}	Drain-Source Breakdown Voltage	I_D=-250μA, V_{GS}=0V	-30			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-24V, V_{GS}=0V			-1	μA
		T_J=55°C			-5	
I_{GSS}	Gate-Body leakage current	V_{DS}=0V, V_{GS}=±20V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=-250μA	-1.0	-1.8	-2.5	V
$I_{D(ON)}$	On state drain current	V_{GS}=-10V, V_{DS}=-5V	-30			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=-10V, I_D=-8A		22	25	mΩ
		T_J=125°C		27	33	
		V_{GS}=-4.5V, I_D=-5.6A		32	36	mΩ
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-7.1A		19.6		S
V_{SD}	Diode Forward Voltage	I_S=-1A,V_{GS}=0V		-0.7	-1	V
I_S	Maximum Body-Diode Continuous Current				-4.2	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=-15V, f=1MHz		1573		pF
C_{oss}	Output Capacitance			319		pF
C_{rss}	Reverse Transfer Capacitance			211		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		6.7		Ω
SWITCHING PARAMETERS						
Q_g(10V)	Total Gate Charge (10V)	V_{GS}=-10V, V_{DS}=-15V, I_D=-7.1A		30.9		nC
Q_g(4.5V)	Total Gate Charge (4.5V)			16.1		nC
Q_{gs}	Gate Source Charge			8		nC
Q_{gd}	Gate Drain Charge			4.4		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=-10V, V_{DS}=-15V, R_L=2.2Ω, R_{GEN}=3Ω		9.5		ns
t_r	Turn-On Rise Time			8		ns
$t_{D(off)}$	Turn-Off DelayTime			44.2		ns
t_f	Turn-Off Fall Time			22.2		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=-7.1A, dI/dt=100A/μs		25.5		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=-7.1A, dI/dt=100A/μs		14.7		nC

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A =25°C. The value in any given application depends on the user's specific board design. The current rating is based on the t≤ 10s thermal resistance rating.

B: Repetitive rating, pulse width limited by junction temperature.

C. The $R_{\theta JA}$ is the sum of the thermal impedence from junction to lead $R_{\theta JL}$ and lead to ambient.

D. The static characteristics in Figures 1 to 6,12,14 are obtained using 80μs pulses, duty cycle 0.5% max.

E. These tests are performed with the device mounted on 1 in^2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulse rating.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

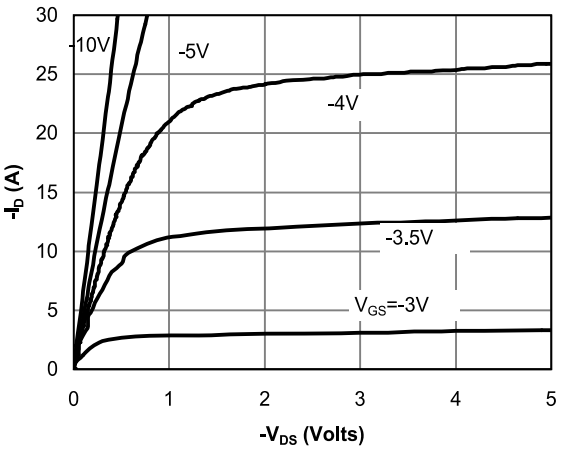


Fig 1: On-Region Characteristics

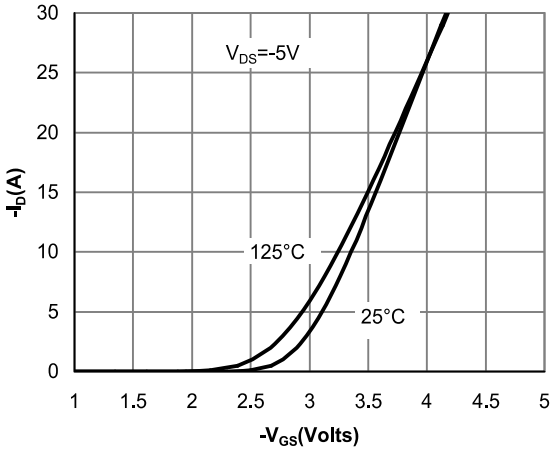


Figure 2: Transfer Characteristics

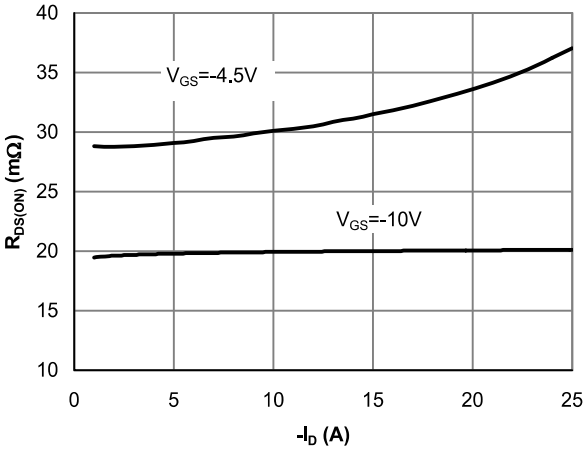


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

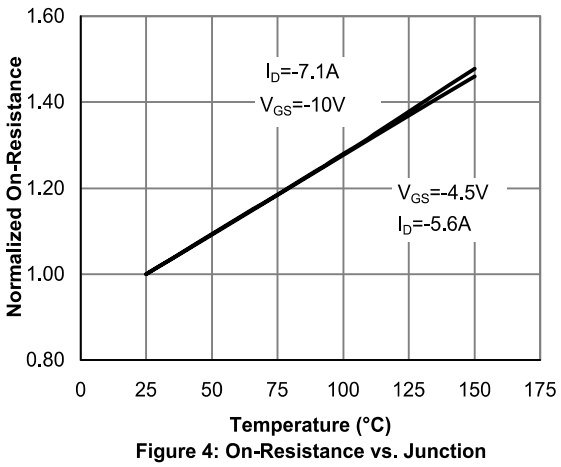


Figure 4: On-Resistance vs. Junction Temperature

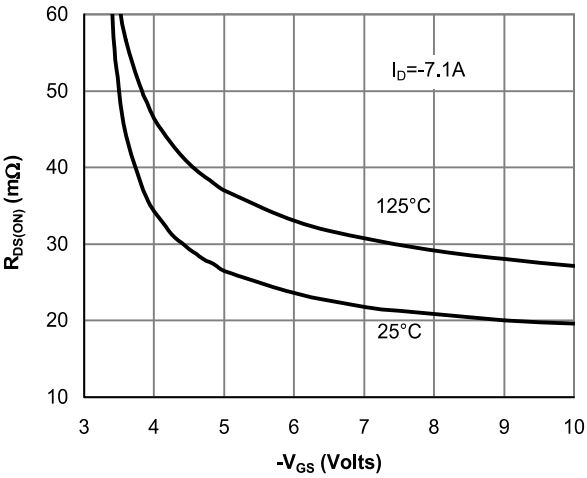


Figure 5: On-Resistance vs. Gate-Source Voltage

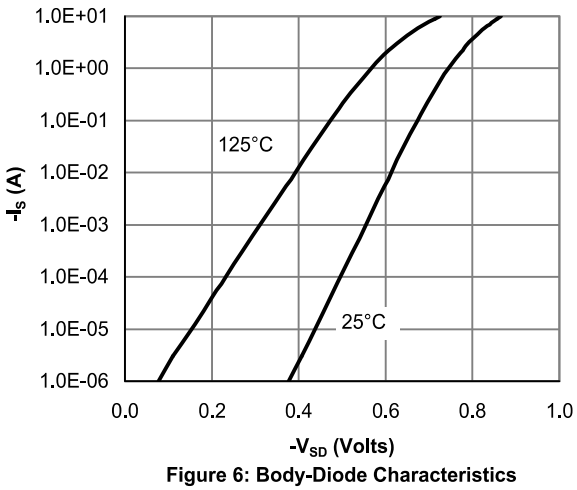


Figure 6: Body-Diode Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS: P-CHANNEL

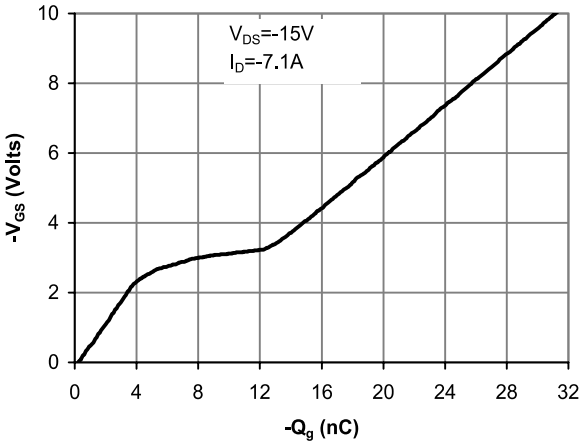


Figure 7: Gate-Charge Characteristics

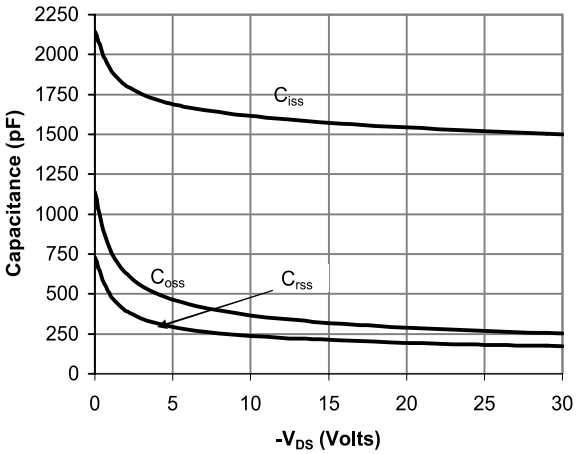


Figure 8: Capacitance Characteristics

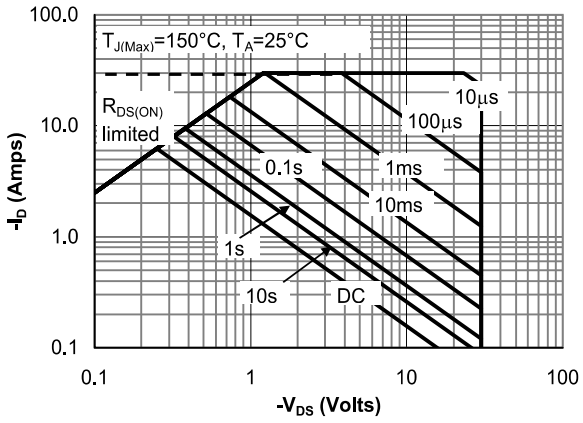


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

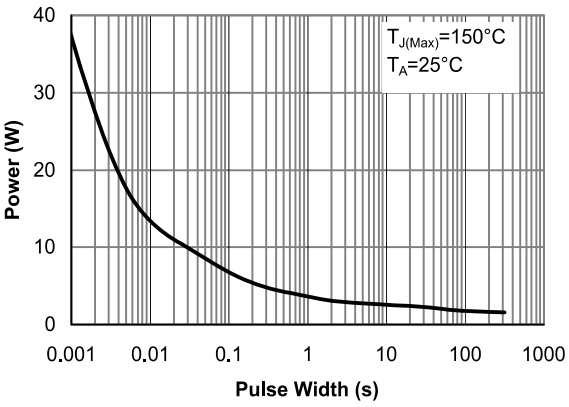


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

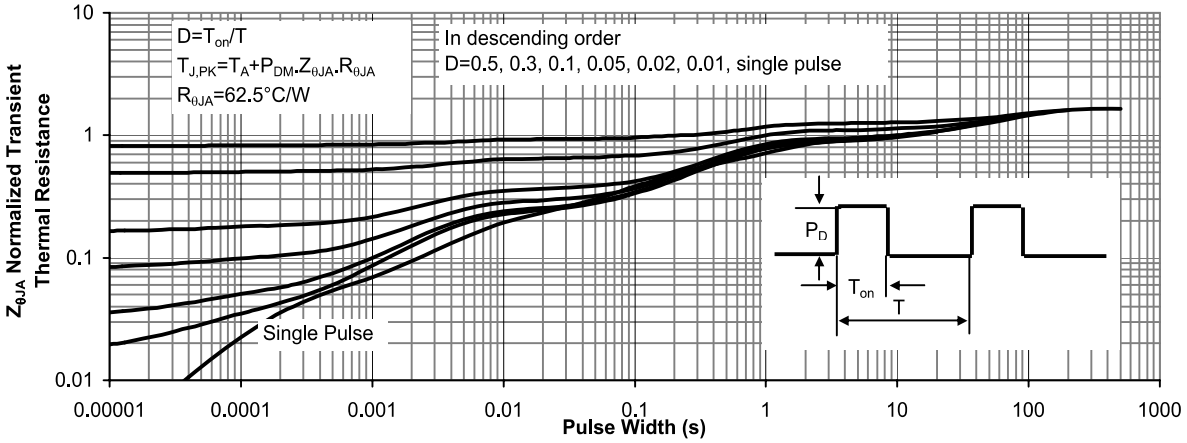


Figure 11: Normalized Maximum Transient Thermal Impedance

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