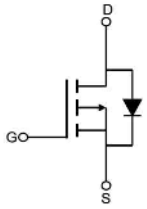
TP4409S

P-Channel Enhancement Mosfet

Feature

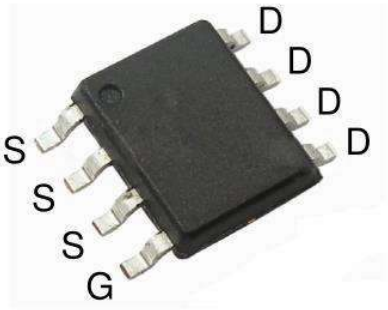
- -40V,-12A
  $R_{DS(ON)}$ <14mΩ @V_{GS}=-10V
  $R_{DS(ON)}$ <20mΩ @V_{GS}=-4.5V
- Advanced Trench Technology
- Lead free product is acquired



Schematic diagram

Application

- PWM applications
- Load Switch
- Power management



SOP-8

ABSOLUTE MAXIMUM RATINGS (T_a=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current (T_a =25℃)	I_D	-12	A
Continuous Drain Current (T_a =100℃)	I_D	-8.5	A
Pulsed Drain Current (1)	I_{DM}	-26	A
Singel Pulsed Avalanche Energy (2)	E_{AS}	146	mJ
Power Dissipation	P_D	2.5	W
Thermal Resistance from Junction to Case(4)	$R_{\theta JC}$	16	℃/W
Junction Temperature	T_J	150	℃
Storage Temperature	T_{STG}	-55~ +150	℃

MOSFET ELECTRICAL CHARACTERISTICS(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	-40	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-40V, V_{GS} = 0V	-	-	-1	μA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V,V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage(3)	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	-1.0	-1.6	-2.5	V
Drain-source on-resistance(3)	$R_{DS(on)}$	V_{GS} =-10V, I_D =-10A	-	12	14	mΩ
		V_{GS} =-4.5V, I_D =-8A	-	17.5	20	
Dynamic characteristics						
Input Capacitance	C_{iss}	V_{DS} =-15V, V_{GS} =0V, f =1MHz	-	3500	-	pF
Output Capacitance	C_{oss}		-	323	-	
Reverse Transfer Capacitance	C_{rss}		-	222	-	
Switching characteristics						
Turn-on delay time	$t_{d(on)}$	V_{DD}=-15V, I_D=-1A, V_{GS}=-10V, R_G=3.3Ω	-	40	-	ns
Turn-on rise time	t_r		-	35	-	
Turn-off delay time	$t_{d(off)}$		-	10	-	
Turn-off fall time	t_f		-	9.6	-	
Total Gate Charge	Qg	VDS=-20V, ID=-6A, VGS=-4.5V	-	28	-	nC
Gate-Source Charge	Qgs		-	7.7	-	
Gate-Drain Charge	Qgd		-	7.5	-	
Source-Drain Diode characteristics						
Diode Forward voltage(3)	V_{DS}	V_{GS} =0V, I_S=-1A	-	-	-1.2	V
Diode Forward current(4)	I_S		-	-	-12	A

Notes:

1. Repetitive Rating: pulse width limited by maximum junction temperature
2. EAS Condition:T_J=25℃,V_{DD}=-25V,R_G=25Ω,L=0.1mH,I_{AS}=-54A
3. Pulse Test: pulse width≤300μs, duty cycle≤2%
4. Surface Mounted on FR4 Board,t≤10 sec

Typical Characteristics

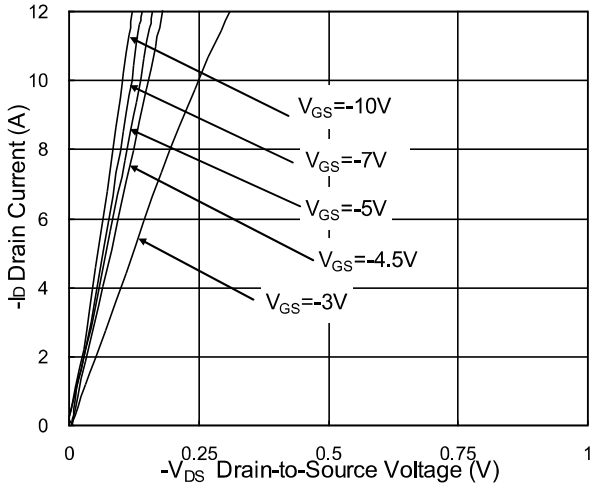


Fig.1 Typical Output Characteristics

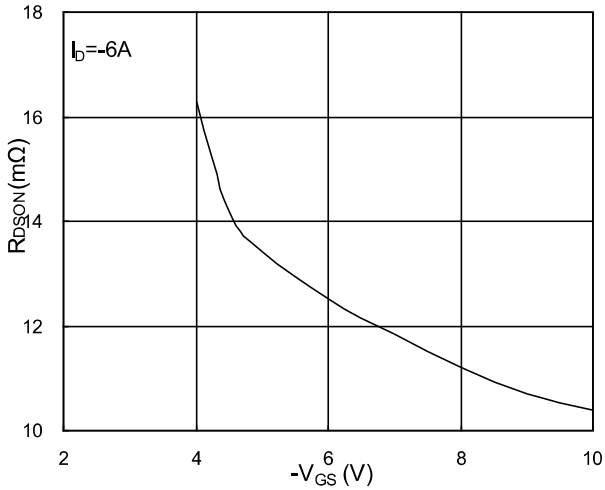


Fig.2 On-Resistance v.s Gate-Source

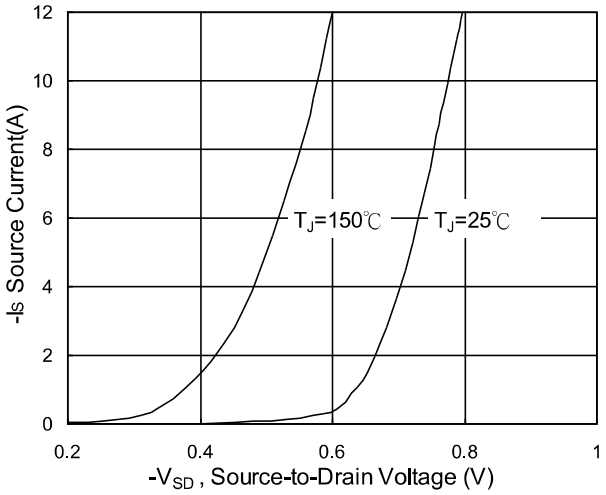


Fig.3 Forward Characteristics Of Reverse

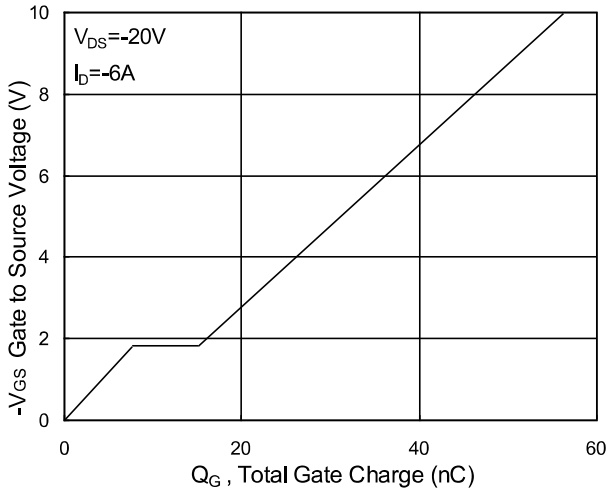


Fig.4 Gate-Charge Characteristics

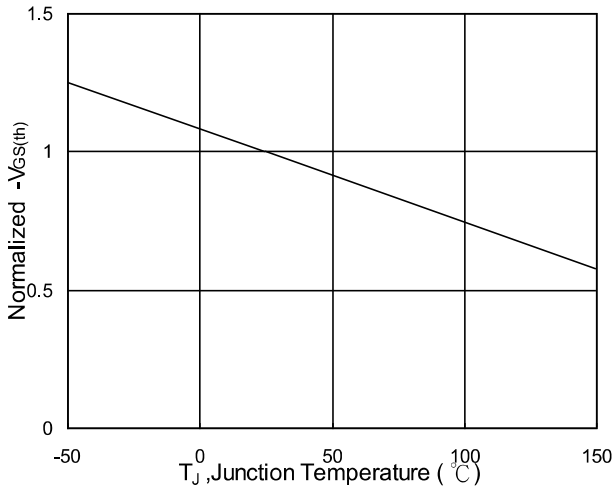


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

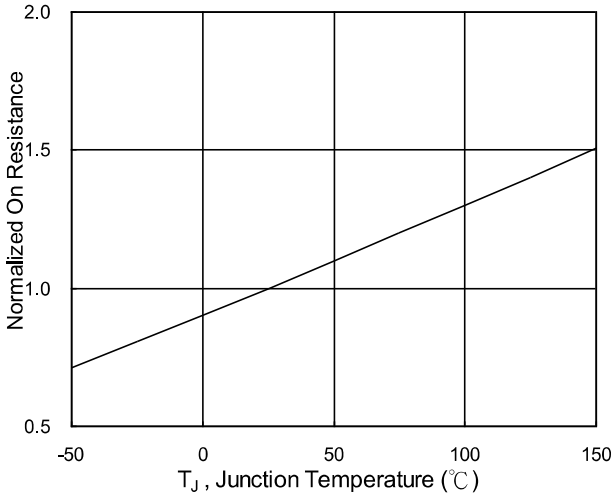


Fig.6 Normalized R_{DSON} v.s T_J

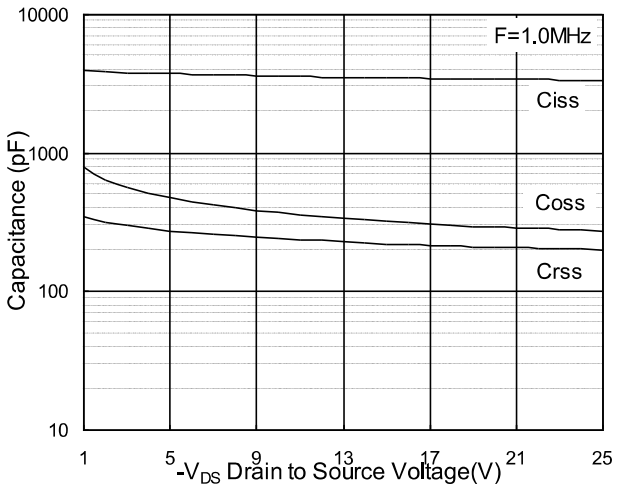


Fig.7 Capacitance

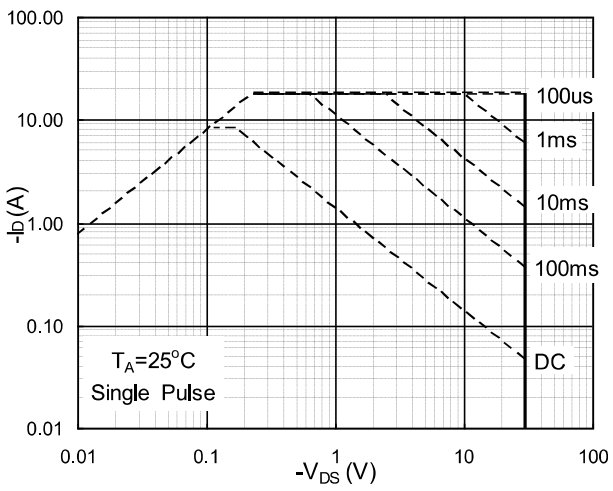


Fig.8 Safe Operating Area

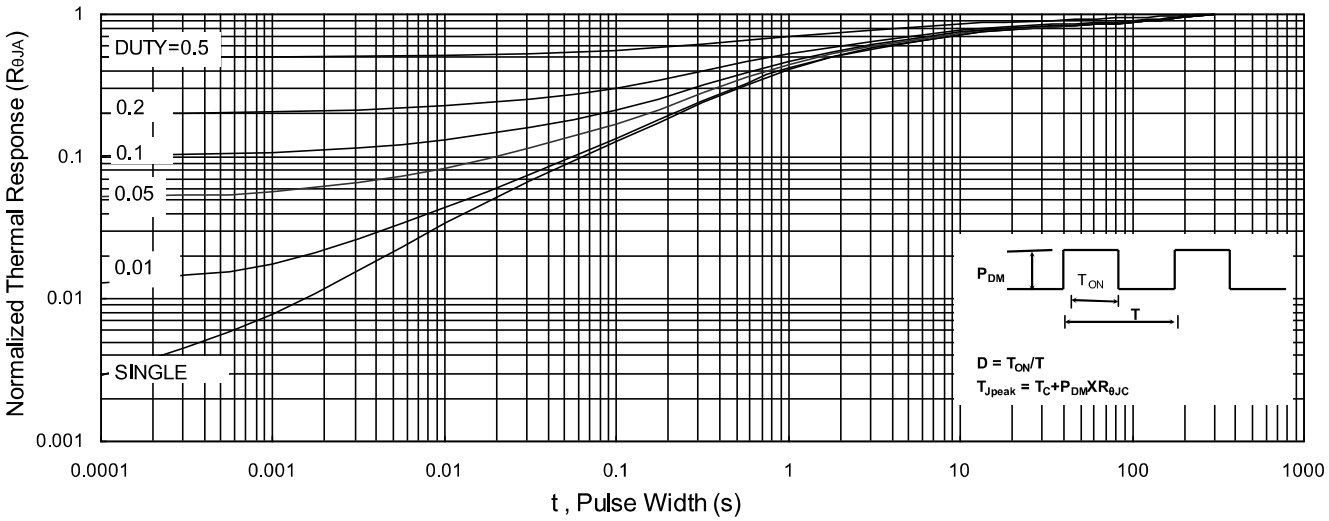


Fig.9 Normalized Maximum Transient Thermal Impedance

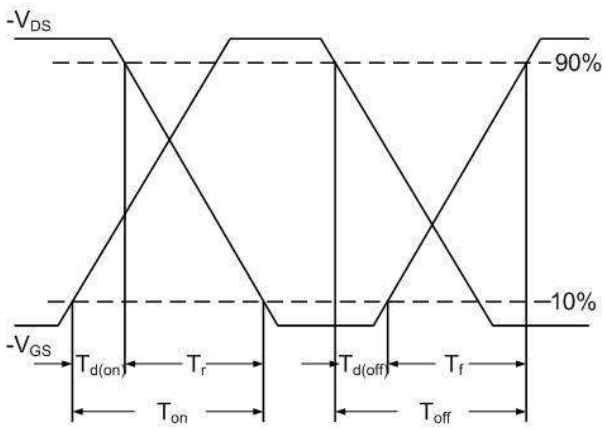


Fig.10 Switching Time Waveform

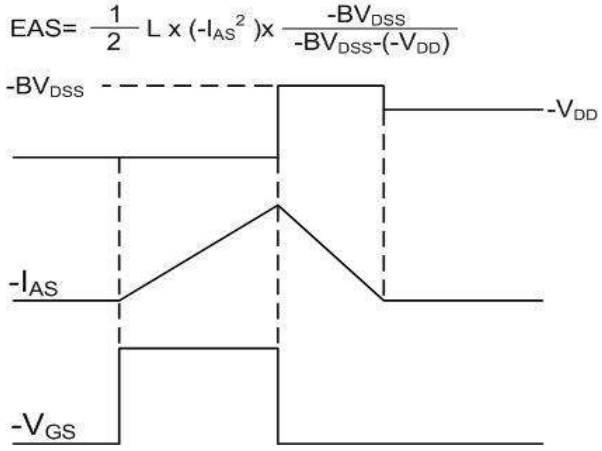
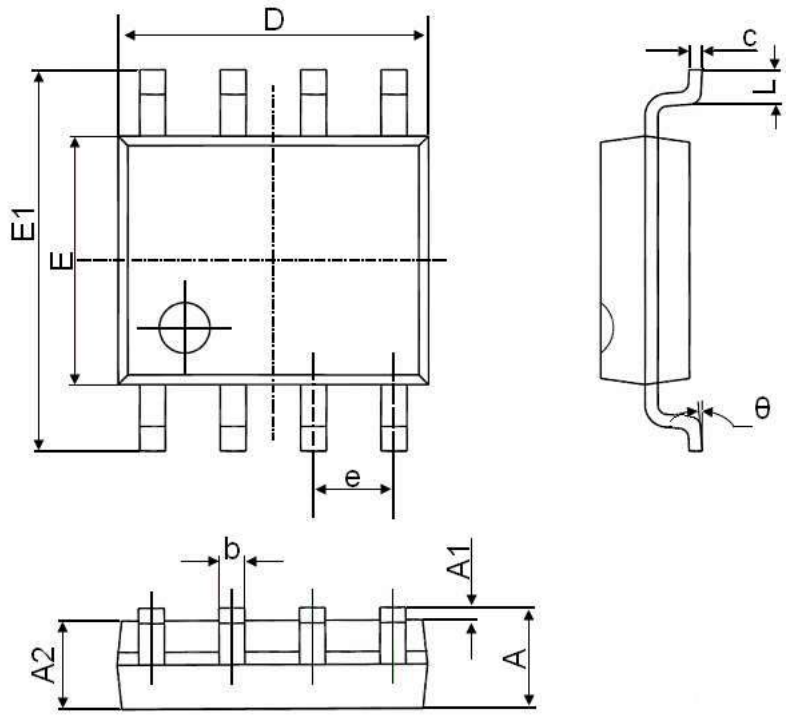


Fig.11 Unclamped Inductive Waveform

SOP-8 Package Information



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
θ	0°	8°	0°	8°