N-Channel Enhancement Mode MOSFET

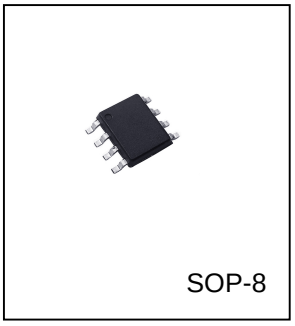
FEATURES

4402
N-Channel MOSFET

•Advanced Trench Process Technology

•High Density Cell Design for Ultra Low On-Resistance

•Lead free product is acquired

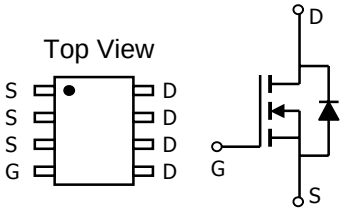


•VDS (V) = 30V ID = 12A

•RDS(ON) < 14mΩ (VGS = 10V)

•RDS(ON) < 16mΩ (VGS = 4.5V)

•RDS(ON) < 22mΩ (VGS = 2.5V)



Absolute Maximum Ratings (TA=25oC, unless otherwise noted)

Parameter		Symbol	Maximum	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current [A]	T_A=25°C	I	12	A
	T =70°C		10	
Pulsed Drain Current [B]		I_{DM}	80	
Power Dissipation	T_A=25°C	P_D	3	W
	T_A=70°C		2.1	
Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Parameter		Symbol	Typ	Max	Unit
Maximum Junction-to-Ambient [A]	t ≤ 10s	$R_{\theta JA}$	23	40	°C/W
Maximum Junction-to-Ambient [A]	Steady-State		48	65	°C/W
Maximum Junction-to-Lead [C]	Steady-State	$R_{\theta JL}$	12	16	°C/W

Electrical Characteristics (TA=25°C, unless otherwise noted) 4402

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}= ±12V			100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS} I_D=250μA	0.6	0.8	1.2	V
$I_{D(ON)}$	On state drain current	V_{GS}=4.5V, V_{DS}=5V	60			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V, I_D=12A		11.1	14	mΩ
		T_J=125°C		16	19.2	
		V_{GS}=4.5V, I_D=10A		13.1	16	mΩ
		V_{GS}=2.5V, I_D=8A		21	26	mΩ
g_{FS}	Forward Transconductance	V_{DS}=5V, I_D=5A	25	50		S
V_{SD}	Diode Forward Voltage	I_S=10A,V_{GS}=0V		0.8	1	V
I_S	Maximum Body-Diode Continuous Current				4.5	A
DYNAMIC PARAMETERS						
C_{iss}	Input Capacitance	V_{GS}=0V, V_{DS}=15V, f=1MHz		1630		pF
C_{oss}	Output Capacitance			201		pF
C_{rss}	Reverse Transfer Capacitance			142		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1MHz		0.8		Ω
SWITCHING PARAMETERS						
Q_g	Total Gate Charge	V_{GS}=4.5V, V_{DS}=15V, I_D=12A		19		nC
Q_{gs}	Gate Source Charge			3.3		nC
Q_{gd}	Gate Drain Charge			5.2		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=10V, V_{DS}=15V, R_L=1.2Ω, R_{GEN}=3Ω		3		ns
t_r	Turn-On Rise Time			4.7		ns
$t_{D(off)}$	Turn-Off DelayTime			33.5		ns
t_f	Turn-Off Fall Time			6		ns
t_{rr}	Body Diode Reverse Recovery Time	I_F=10A, dI/dt=100A/μs		21		ns
Q_{rr}	Body Diode Reverse Recovery Charge	I_F=10A, dI/dt=100A/μs		11		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 a 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 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.

4402 Typical Characteristics

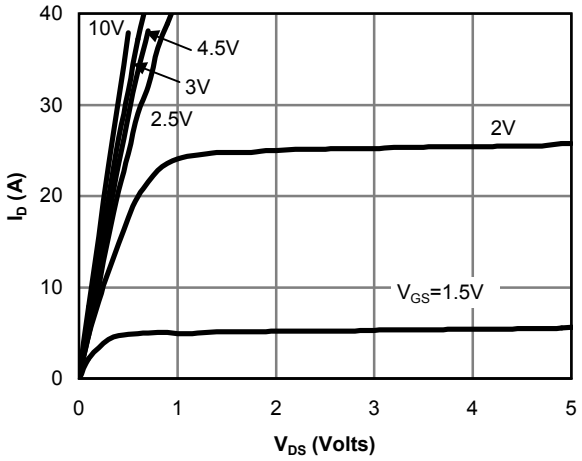


Fig 1: On-Region Characteristics

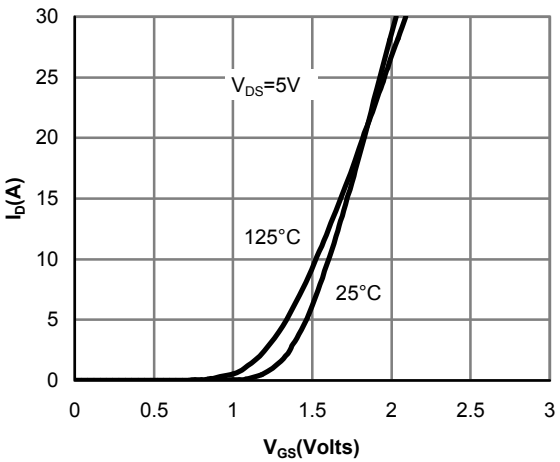


Figure 2: Transfer Characteristics

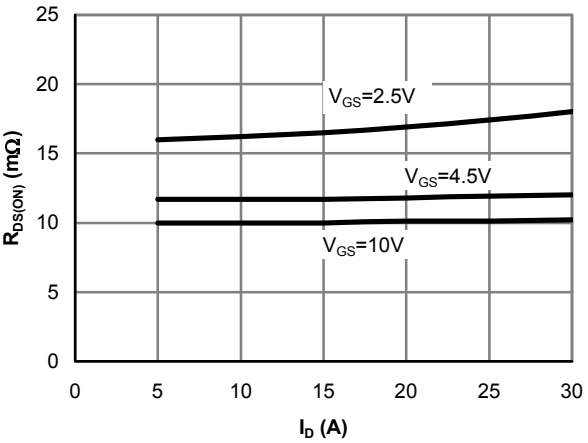


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

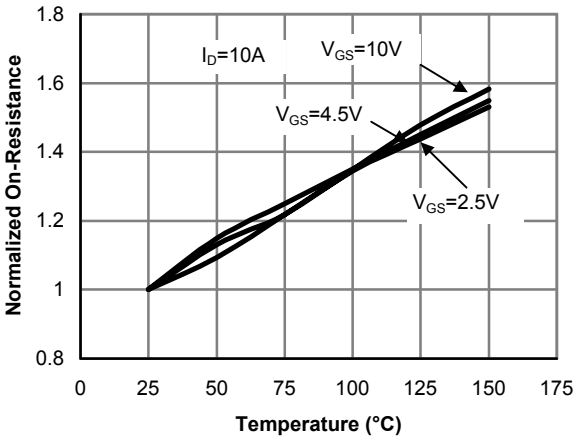


Figure 4: On-Resistance vs. Junction Temperature

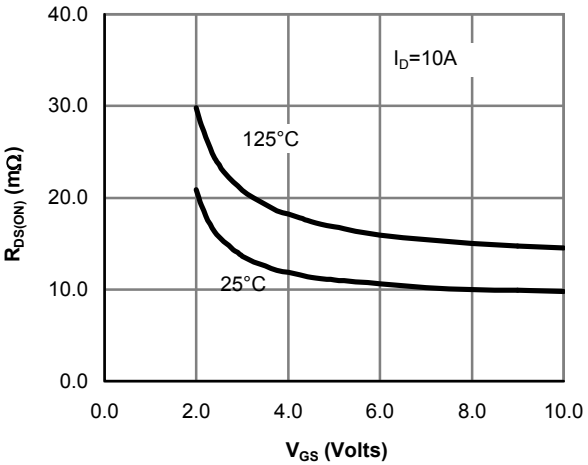


Figure 5: On-Resistance vs. Gate-Source Voltage

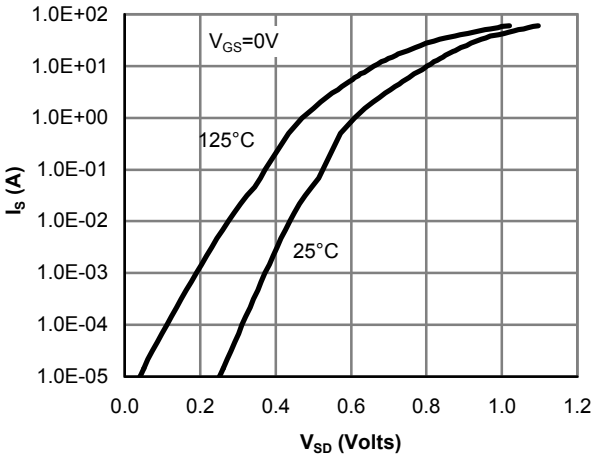


Figure 6: Body-Diode Characteristics

4402 Typical Characteristics

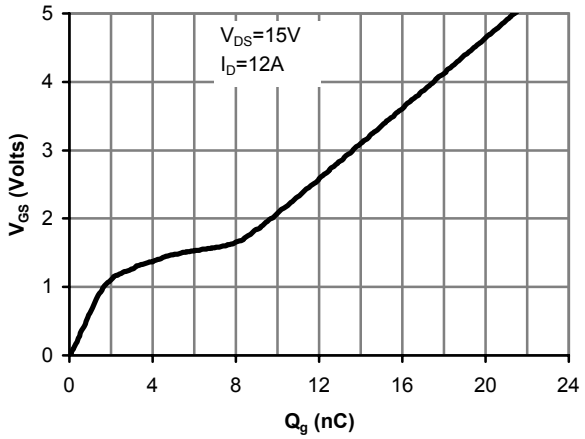


Figure 7: Gate-Charge Characteristics

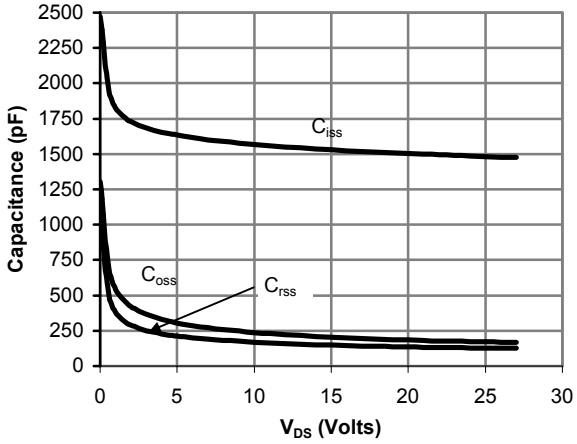


Figure 8: Capacitance Characteristics

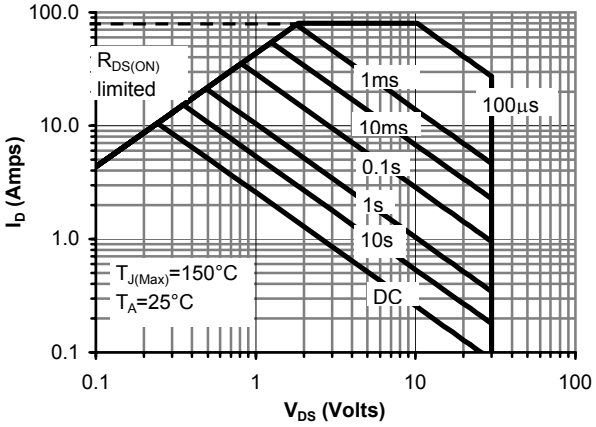


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

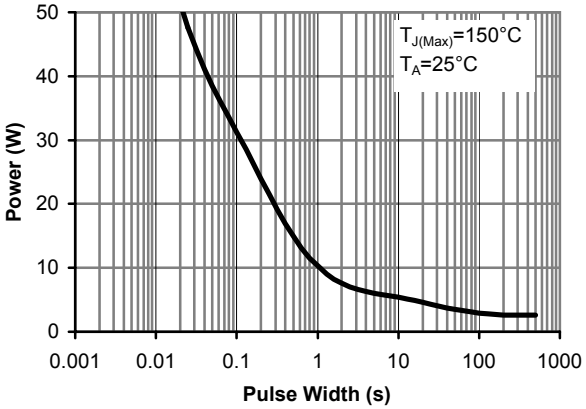


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

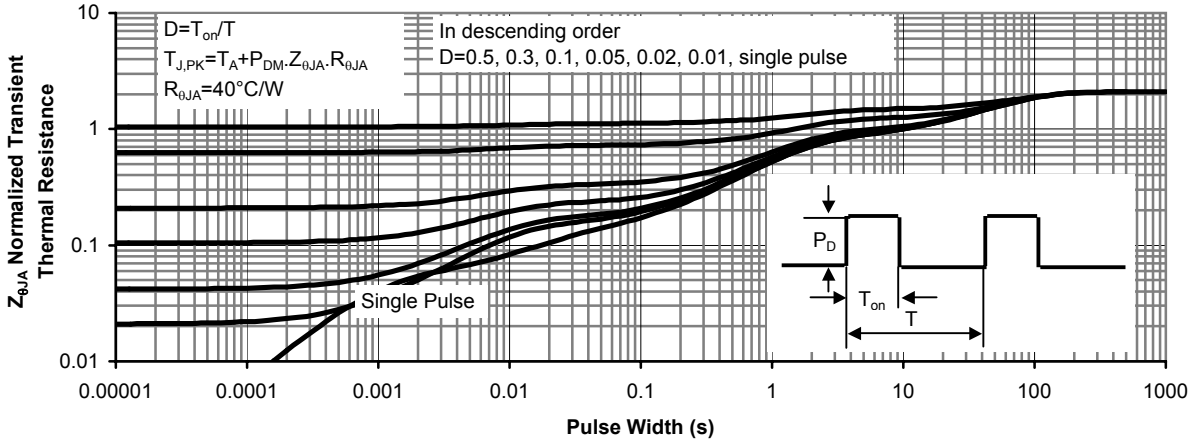


Figure 11: Normalized Maximum Transient Thermal Impedance