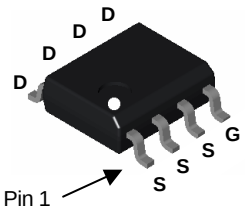
SOP-8 Plastic-Encapsulate MOSFETS

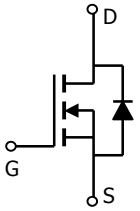
TF4402 N-Channel Power MOSFET

PRODUCT SUMMARY		
V_{DSS}	I_D	$R_{DS(on)}$ (m-ohm) Typ
20V	20A	4.5@ V_{GS} = 4.5 V
		6.0@ V_{GS} = 2.5V

SO-8L



Equivalent Circuit



MARKING

Y :year code W :week code

General Features

- Excellent gate charge x $R_{DS(on)}$ product(FOM)
- Very low on-resistance $R_{DS(on)}$
- 150 °C operating temperature
- Pb-free lead plating
- 100% UIS tested

Application

- DC/DC Converter
- Ideal for high-frequency switching and synchronous rectification

Absolute Maximum Ratings T_A=25°C unless otherwise noted

Parameter		Symbol	Maximum	Units
Drain-Source Voltage		V_{DS}	20	V
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current [A]	T_A=25°C	I_D	20	A
Pulsed Drain Current [B]		I_{DM}	180	
Power Dissipation	T_A=25°C	P_D	3.5	W
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	$R_{\theta JA}$	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

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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	20			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=20V, V_{GS}=0V			1	μA
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	0.9	1.2	V
$I_{D(ON)}$	On state drain current	V_{GS}=4.5V, V_{DS}=5V	180			A
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=4.5V, I_D=20A		4.5	5.5	mΩ
		V_{GS}=2.5V, I_D=18A		6.0	6.9	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}=10V, f=1MHz		2007		pF
C_{oss}	Output Capacitance			278		pF
C_{rss}	Reverse Transfer Capacitance			252		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=20A		23		nC
Q_{gs}	Gate Source Charge			4		nC
Q_{gd}	Gate Drain Charge			7		nC
$t_{D(on)}$	Turn-On DelayTime	V_{GS}=4.5V, V_{DS}=10V,ID=20A, R_{GEN}=3Ω		12		ns
t_r	Turn-On Rise Time			33		ns
$t_{D(off)}$	Turn-Off DelayTime			48		ns
t_f	Turn-Off Fall Time			95		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.

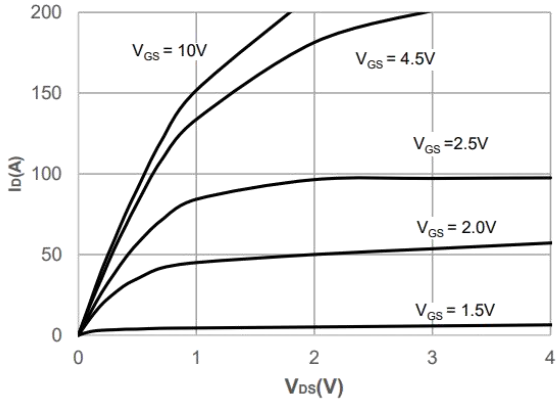
B: Repetitive rating, pulse width limited by junction temperature.

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

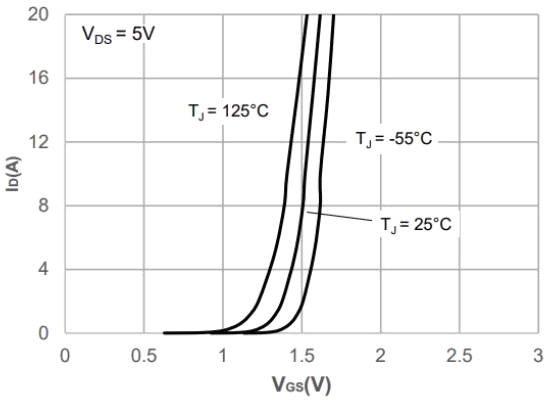
D. The static characteristics in Figures 1 to 6 are obtained using 80μs pulses, duty cycle 0.5% max.

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.

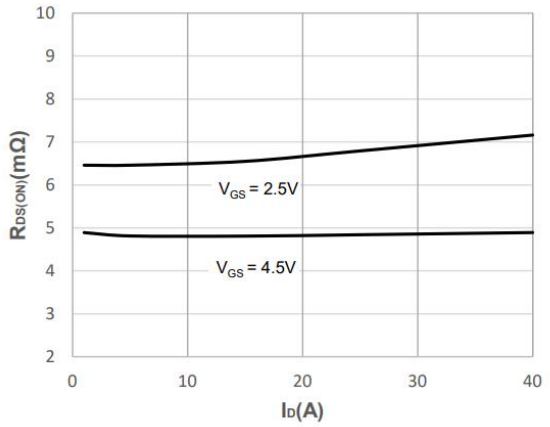
TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



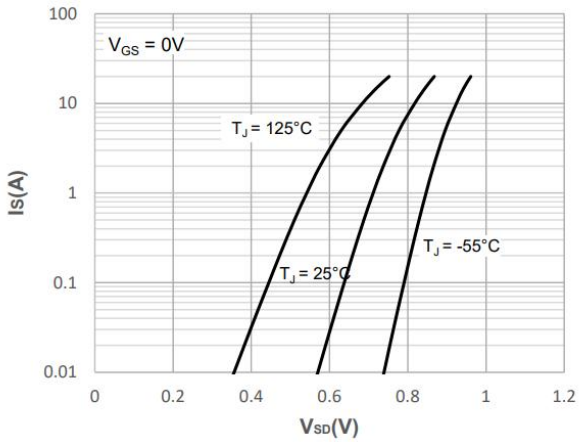
Output Characteristics



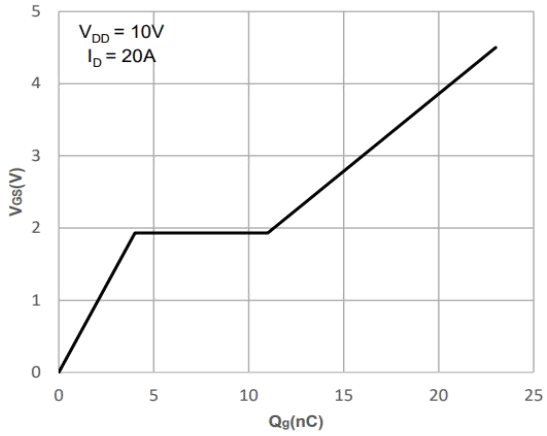
Typical Transfer Characteristics



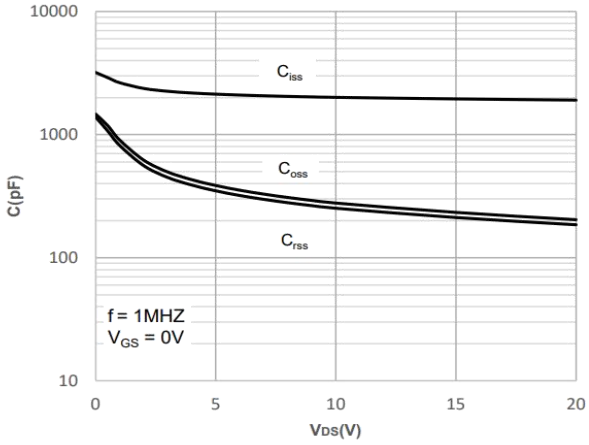
On-resistance vs. Drain Current



Body Diode Characteristics

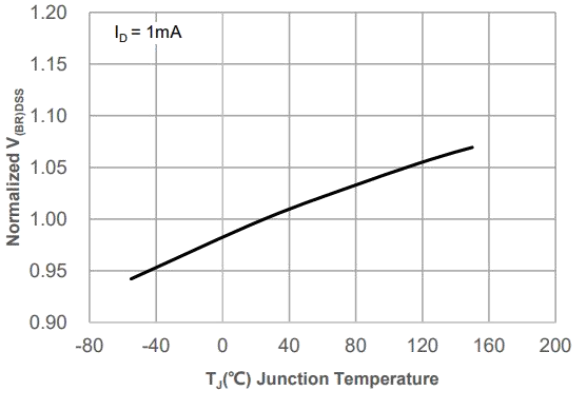


Gate Charge Characteristics



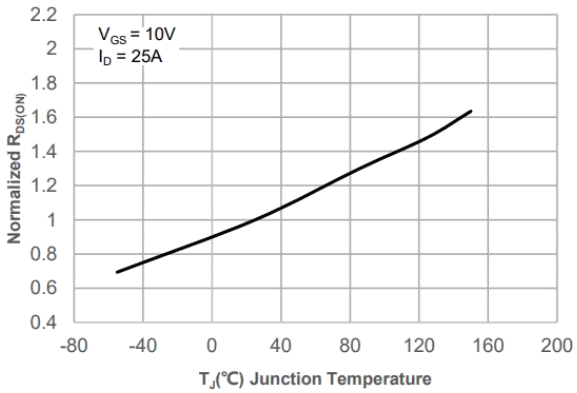
Capacitance Characteristics

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS



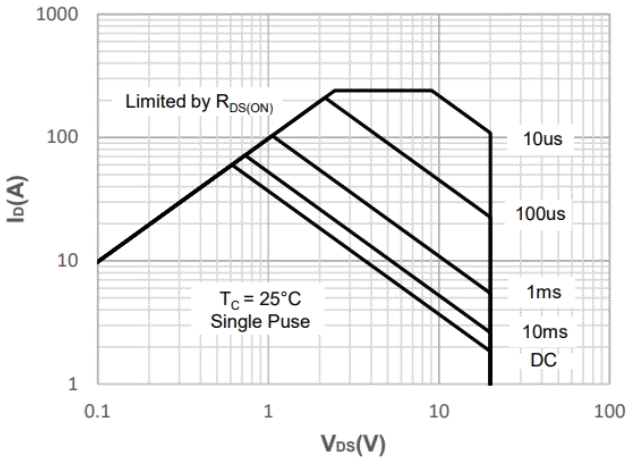
Normalized Breakdown Voltage vs.

Junction Temperature

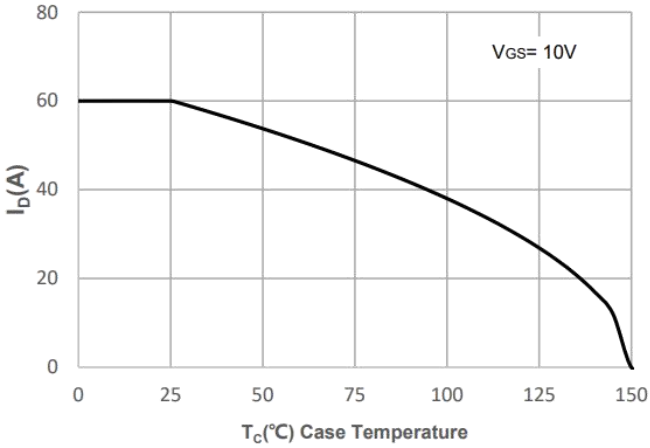


Normalized on Resistance vs.

Junction Temperature

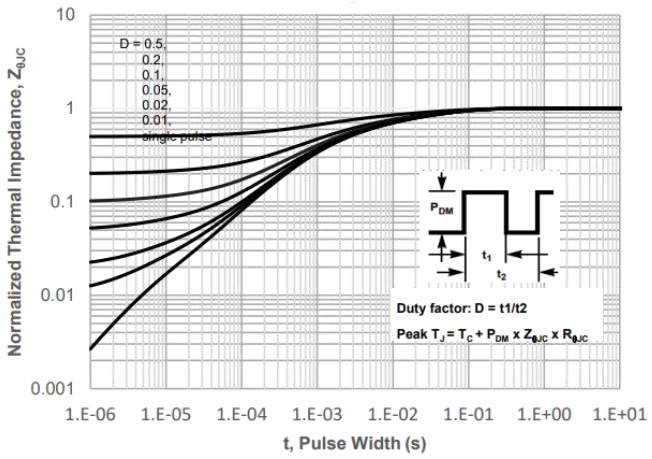


Maximum Safe Operating Area



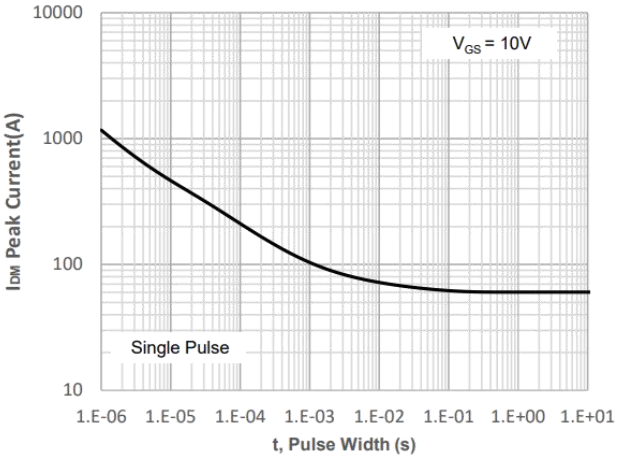
Maximum Continuous Drain Current vs.

Case Temperature



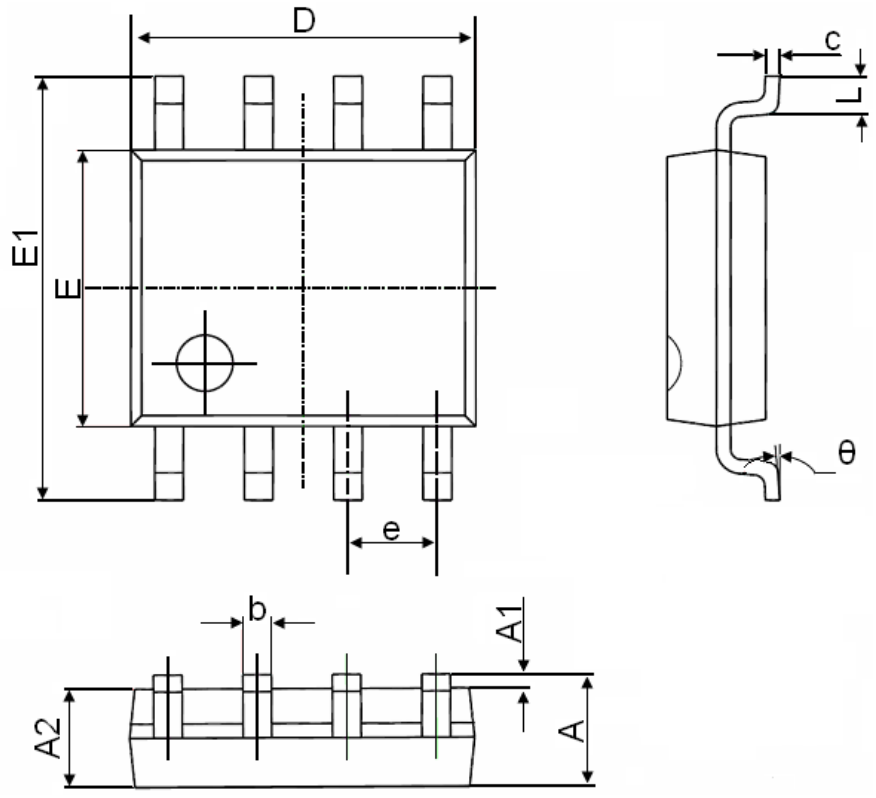
Normalized Maximum Transient

Thermal Impedance



Peak Current Capacity

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°