

General Description

The WST2038 is the highest performance trench N-ch and P-ch MOSFETs with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the small power switching and load switch applications.

The WST2038 meet the RoHS and Green Product requirement with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent $C_{dv/dt}$ effect decline
- Green Device Available

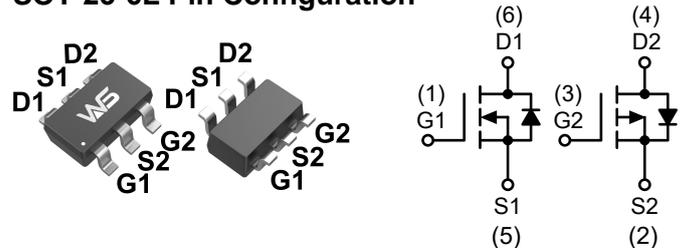
Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D
20V	50m Ω	3.0A
-20V	90m Ω	-2.0A

Applications

- High Frequency Point-of-Load Synchronous Small power switching for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

SOT-23-6L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	20	-20	V
V_{GS}	Gate-Source Voltage	± 12	± 12	V
$I_D@T_c=25^\circ C$	Continuous Drain Current, $V_{GS} @ 4.5V^1$	3.0	-2.0	A
$I_D@T_c=70^\circ C$	Continuous Drain Current, $V_{GS} @ 4.5V^1$	2.1	-1.2	A
I_{DM}	Pulsed Drain Current ²	12	-8	A
$P_D@T_A=25^\circ C$	Total Power Dissipation ³	0.83	0.83	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ C$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-ambient ¹	---	150	$^\circ C/W$

N-Channel Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250uA	20	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =1mA	---	0.024	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =4.5V, I _D =3A	---	50	65	mΩ
		V _{GS} =2.5V, I _D =1.7A	---	65	90	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	0.5	0.7	1	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	-2.51	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =16V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =16V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±8V, V _{DS} =0V	---	---	±100	nA
g _{fs}	Forward Transconductance	V _{DS} =5V, I _D =3A	---	10	---	S
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	2.2	3.4	Ω
Q _g	Total Gate Charge (4.5V)	V _{DS} =10V, V _{GS} =4.5V, I _D =1A	---	4.3	---	nC
Q _{gs}	Gate-Source Charge		---	0.9	---	
Q _{gd}	Gate-Drain Charge		---	1.2	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =10V, V _{GEN} =4.5V, R _G =6Ω, I _D =1A, R _L =10Ω	---	4	---	ns
T _r	Rise Time		---	14	---	
T _{d(off)}	Turn-Off Delay Time		---	5	---	
T _f	Fall Time		---	21	---	
C _{iss}	Input Capacitance	V _{DS} =10V, V _{GS} =0V, f=1MHz	---	220	---	pF
C _{oss}	Output Capacitance		---	65	---	
C _{rss}	Reverse Transfer Capacitance		---	45	---	

Drain-Source Body Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source-Drain Diode Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	1.0	A
V _{SD}	Body Diode Voltage ²	V _{GS} =0V, I _S =1A, T _J =25°C	---	---	1.3	V
t _{rr}	Reverse Recovery Time	I _F =3A, dI/dt=100A/μs, T _J =25°C	---	11	---	nS
Q _{rr}	Reverse Recovery Charge		---	4.0	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- 2.The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- 3.The power dissipation is limited by 150°C junction temperature
- 4.The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.

P-Channel Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250uA	-20	---	---	V
ΔBV _{DSS} /ΔT _J	BV _{DSS} Temperature Coefficient	Reference to 25°C, I _D =-1mA	---	-0.014	---	V/°C
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =-4.5V, I _D =-2A	---	90	120	mΩ
		V _{GS} =-2.5V, I _D =-1A	---	130	180	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250uA	-0.3	-0.5	-1.0	V
ΔV _{GS(th)}	V _{GS(th)} Temperature Coefficient		---	2.3	---	mV/°C
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-16V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =-16V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±8V, V _{DS} =0V	---	---	±100	nA
Q _g	Total Gate Charge (-4.5V)	V _{DS} =-10V, V _{GS} =-4.5V, I _D =-1A	---	4.5	---	nC
Q _{gs}	Gate-Source Charge		---	1.0	---	
Q _{gd}	Gate-Drain Charge		---	1.5	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =-10V, V _{GEN} =-4.5V, R _G =6Ω, I _D =-1A, R _L =10Ω.	---	7	---	ns
T _r	Rise Time		---	15	---	
T _{d(off)}	Turn-Off Delay Time		---	6	---	
T _f	Fall Time		---	28	---	
C _{iss}	Input Capacitance	V _{DS} =-10V, V _{GS} =0V, f=1MHz	---	260	---	pF
C _{oss}	Output Capacitance		---	65	---	
C _{rss}	Reverse Transfer Capacitance		---	45	---	

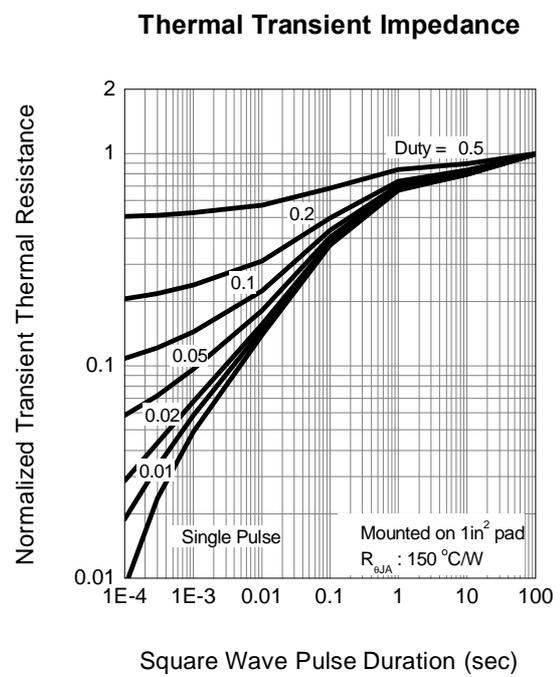
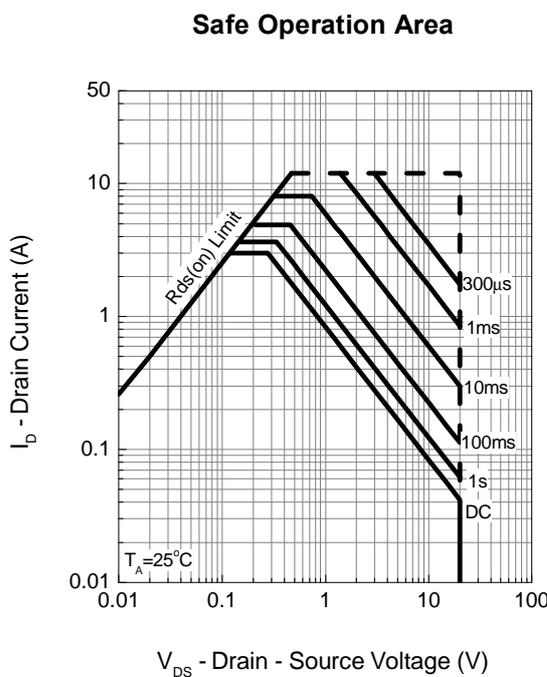
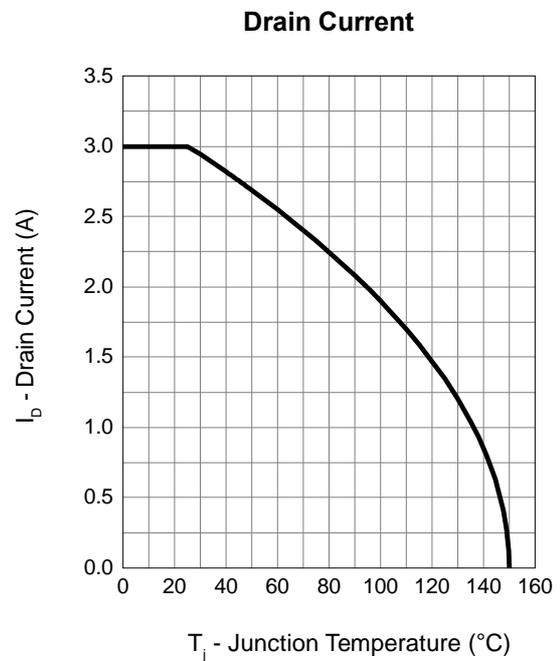
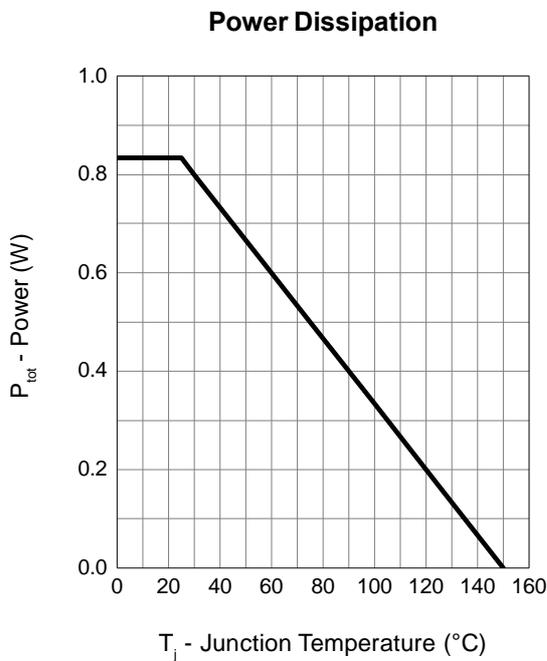
Drain-Source Body Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source-Drain Diode Current ^{1,4}	V _G =V _D =0V, Force Current	---	---	-1.0	A
V _{SD}	Body Diode Voltage ²	V _{GS} =0V, I _S =-1A, T _J =25°C	---	---	-1.3	V
t _{rr}	Reverse Recovery Time	I _F =-2A, dI/dt=100A/μs, T _J =25°C	---	12	---	nS
Q _{rr}	Reverse Recovery Charge		---	4	---	nC

Note :

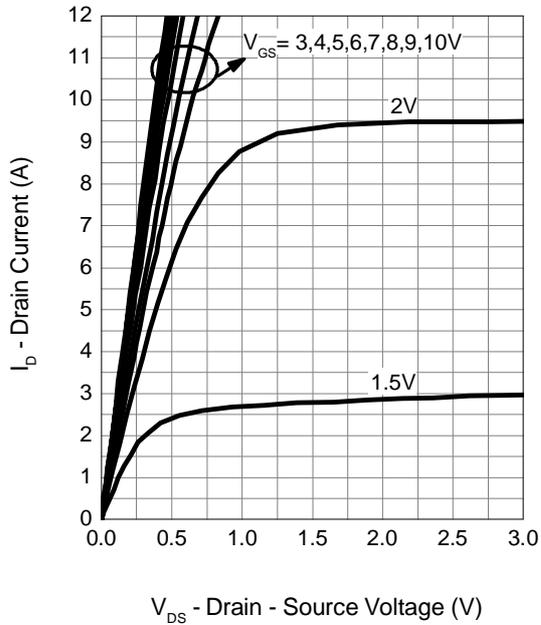
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N-Channel Typical Operating Characteristics

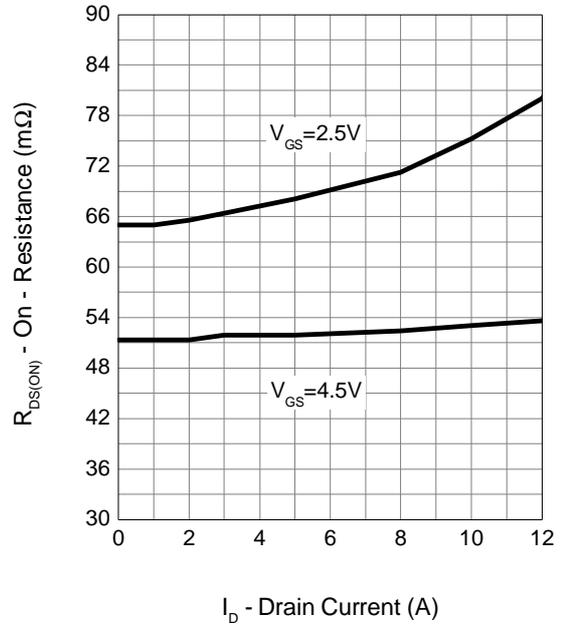


N-Channel Typical Operating Characteristics

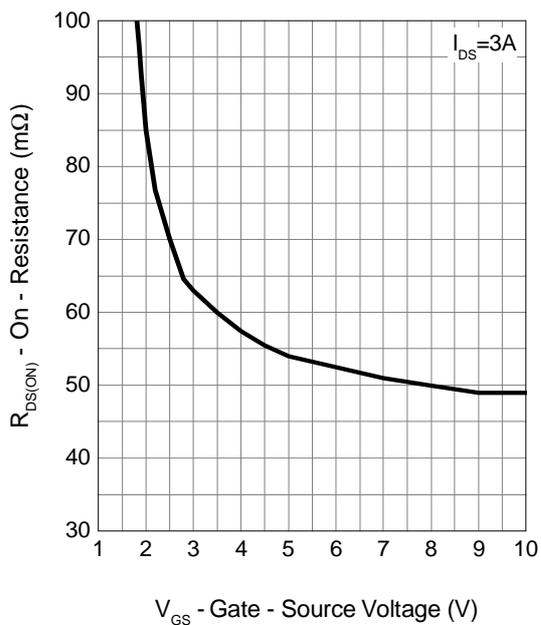
Output Characteristics



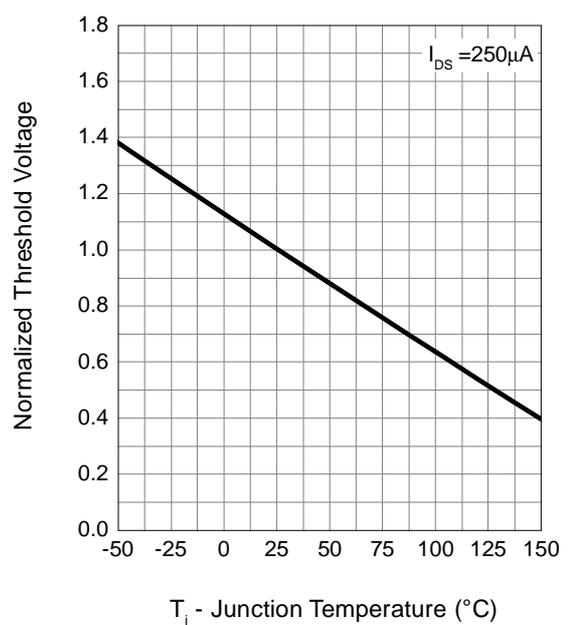
Drain-Source On Resistance



Gate-Source On Resistance

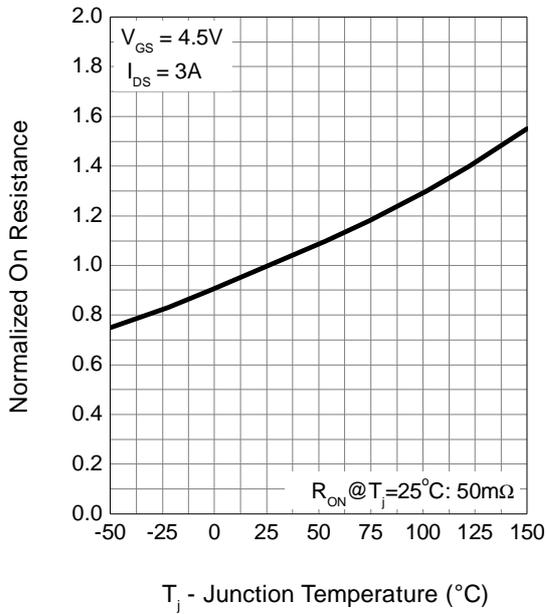


Gate Threshold Voltage

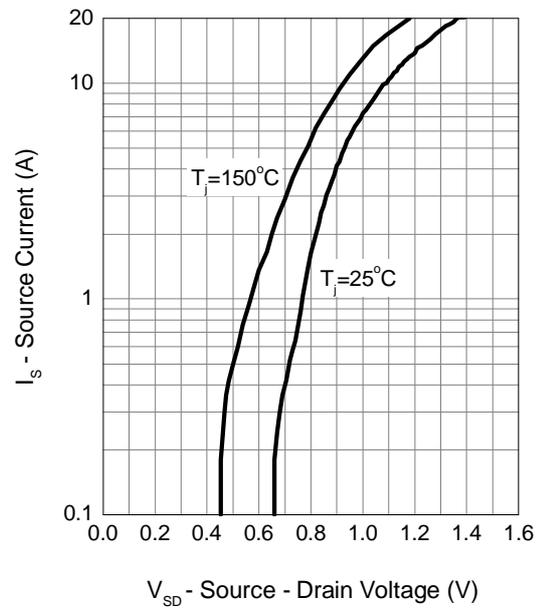


N-Channel Typical Operating Characteristics

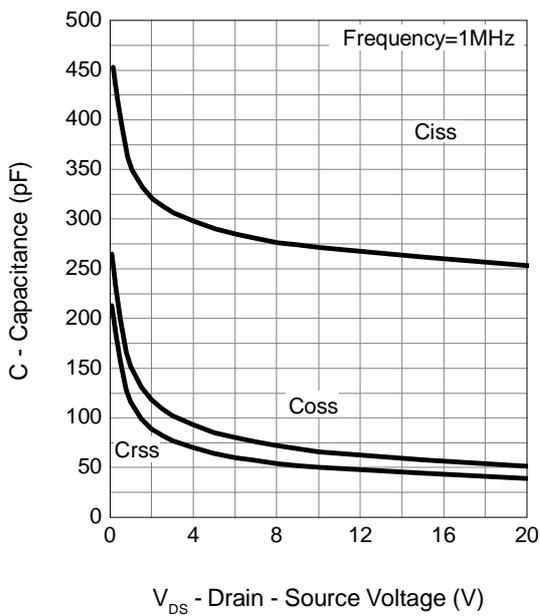
Drain-Source On Resistance



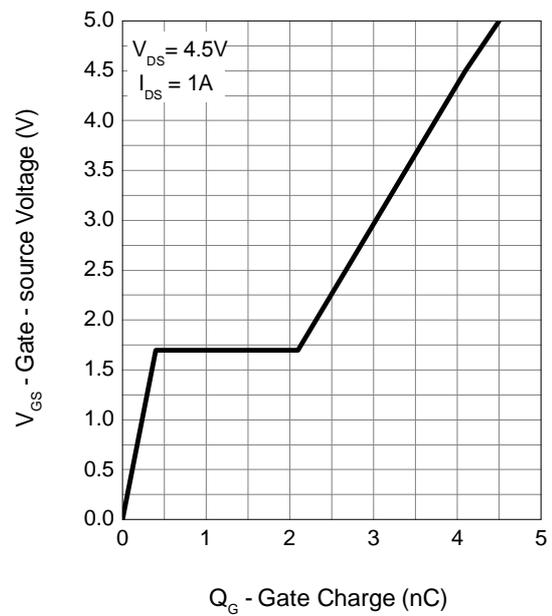
Source-Drain Diode Forward



Capacitance

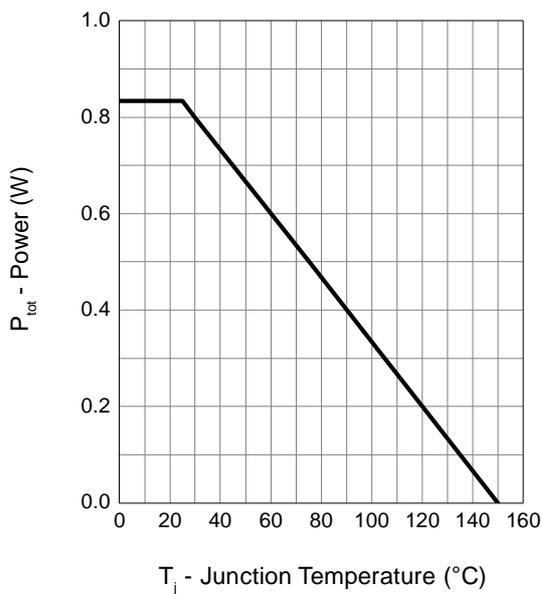


Gate Charge

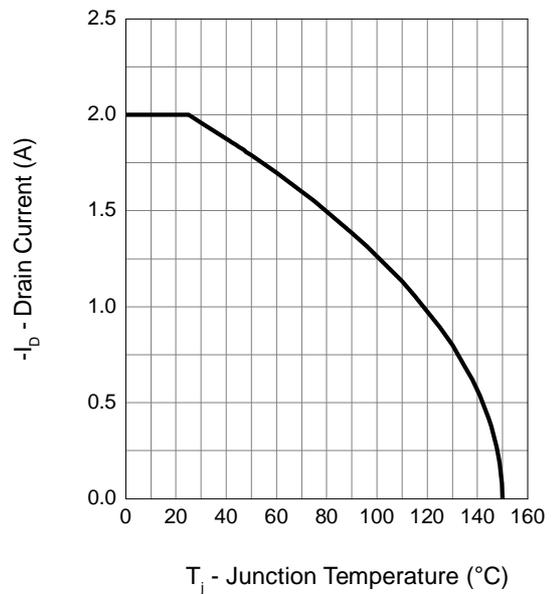


P-Channel Typical Operating Characteristics

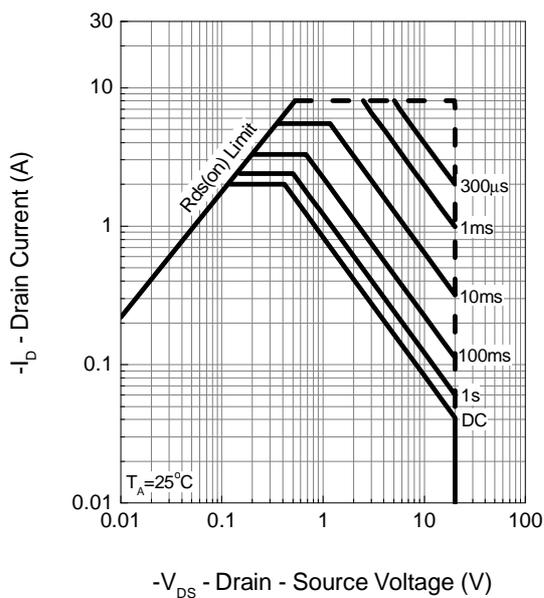
Power Dissipation



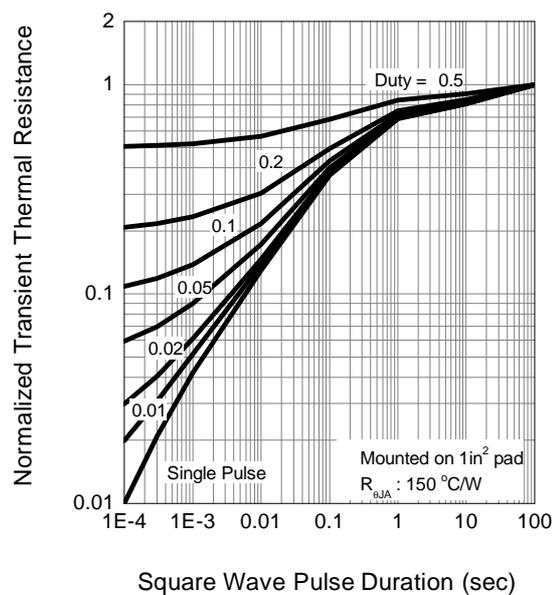
Drain Current



Safe Operation Area

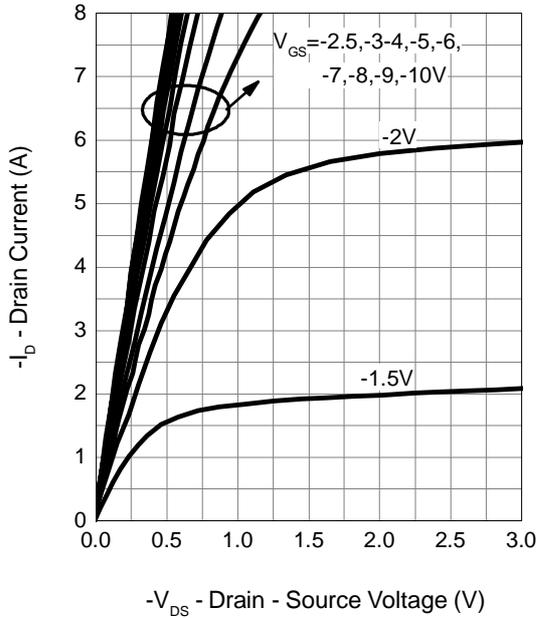


Thermal Transient Impedance

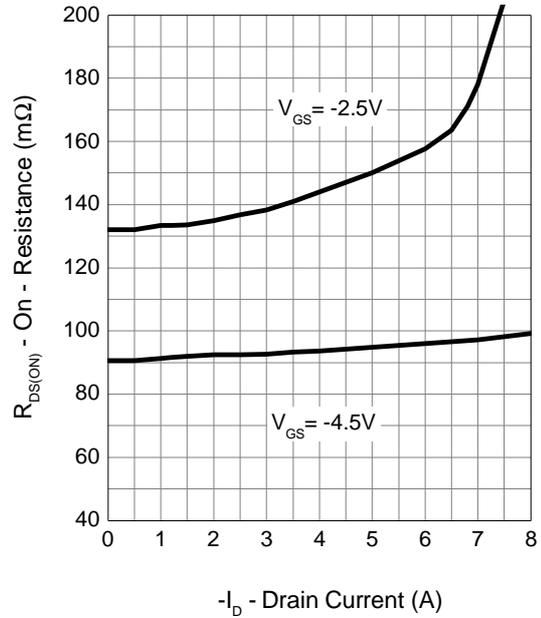


P-Channel Typical Operating Characteristics

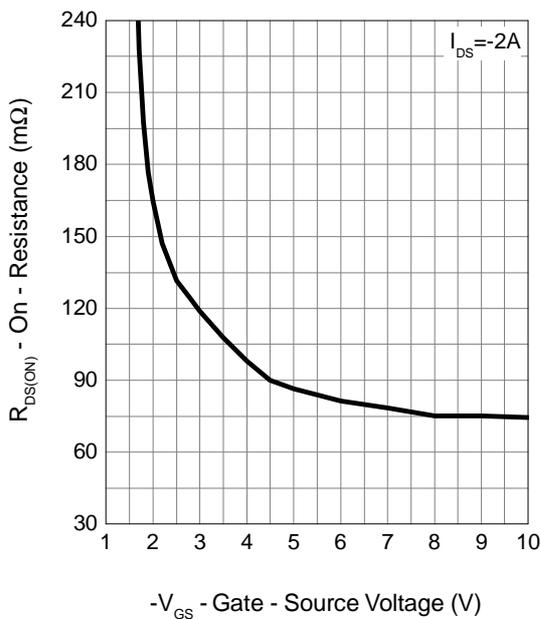
Output Characteristics



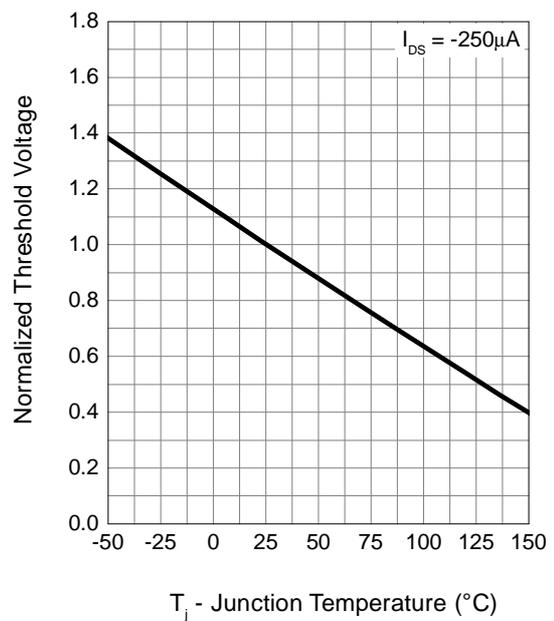
Drain-Source On Resistance



Gate-Source On Resistance

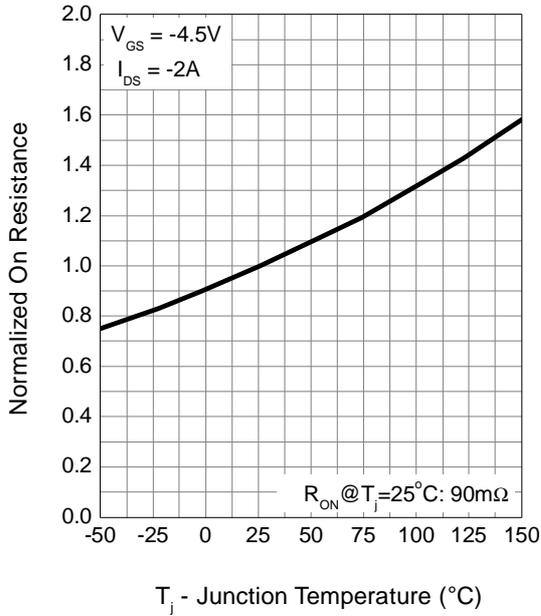


Gate Threshold Voltage

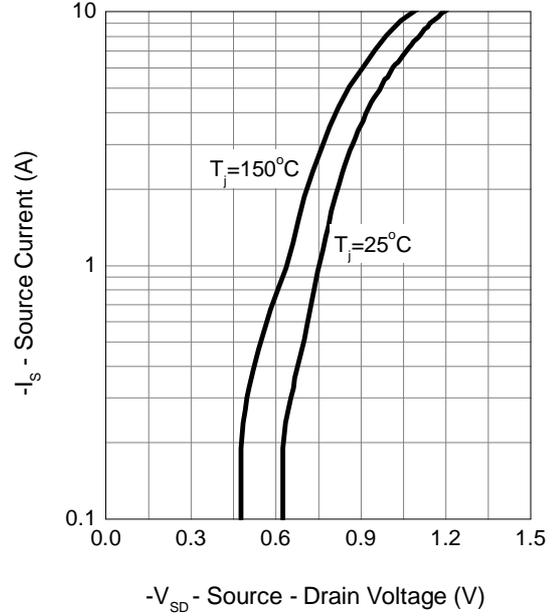


P-Channel Typical Operating Characteristics

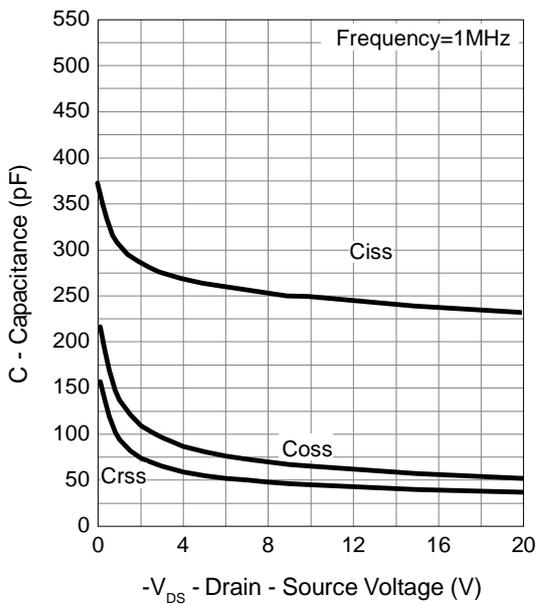
Drain-Source On Resistance



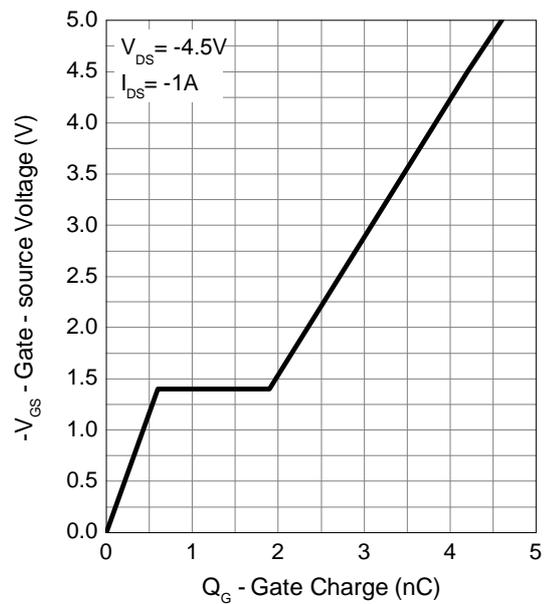
Source-Drain Diode Forward

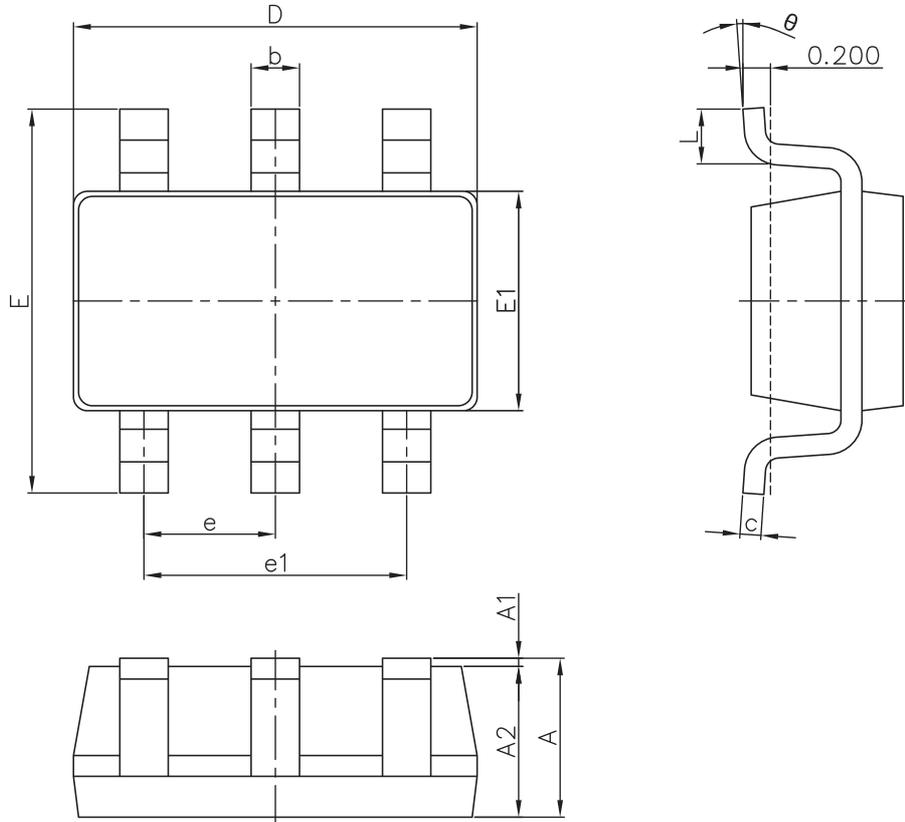


Capacitance



Gate Charge



Packaging information


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



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