

## General Description

The WST2078 is the highest performance trench N-ch and P-ch MOSFETs with extreme high cell density, which provide excellent RDSON and gate charge for most of the small power switching and load switch applications.

The WST2078 meet the RoHS and Green Product requirement with full function reliability approved.

## Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent Cdv/dt effect decline
- Green Device Available

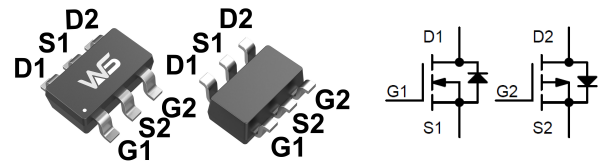
## Product Summary

BVDSS	RDSON	ID
20V	50mΩ	3.0A
-20V	90mΩ	-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	$\pm 12$	$\pm 12$	V
$I_D@T_c=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5V^1$	3.0	-2.0	A
$I_D@T_c=70^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 4.5V^1$	2.1	-1.2	A
$I_{DM}$	Pulsed Drain Current <sup>2</sup>	12	-8	A
$P_D@T_A=25^\circ\text{C}$	Total Power Dissipation <sup>3</sup>	0.83	0.83	W
$T_{STG}$	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	-55 to 150	$^\circ\text{C}$

## Thermal Data

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

**N-Channel Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

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

**Drain-Source Body Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source-Drain Diode Current <sup>1,4</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	1.0	A
V <sub>SD</sub>	Body Diode Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.3	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =3A, di/dt=100A/μs, T <sub>J</sub> =25°C	---	11	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	4.0	---	nC

Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> 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<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

**P-Channel Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

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

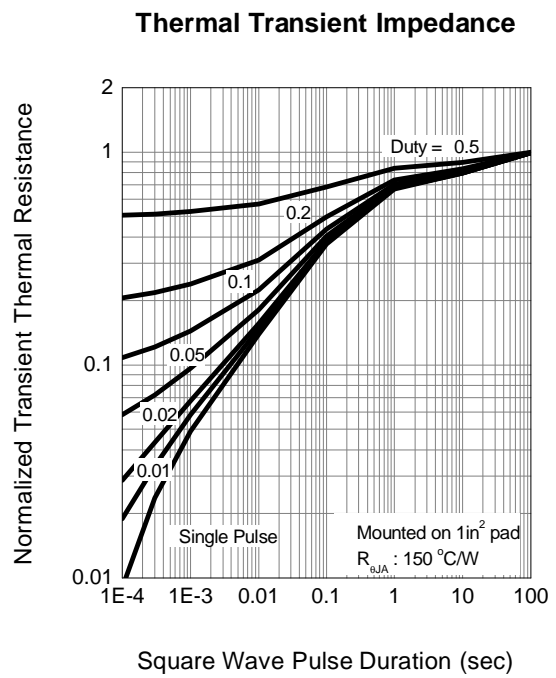
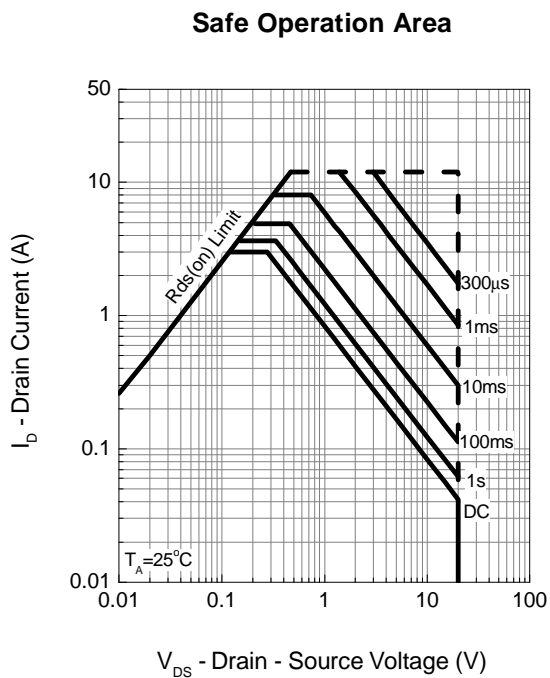
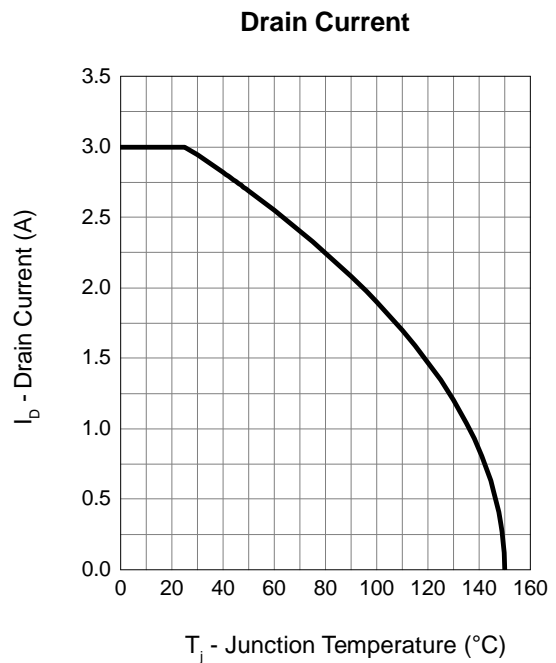
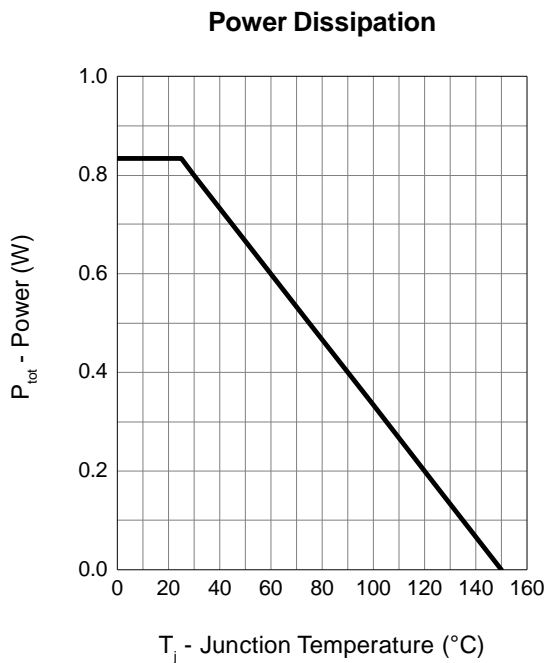
**Drain-Source Body Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source-Drain Diode Current <sup>1,4</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-1.0	A
V <sub>SD</sub>	Body Diode Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1.3	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =-2A, dI/dt=100A/μs, T <sub>J</sub> =25°C	---	12	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	4	---	nC

Note :

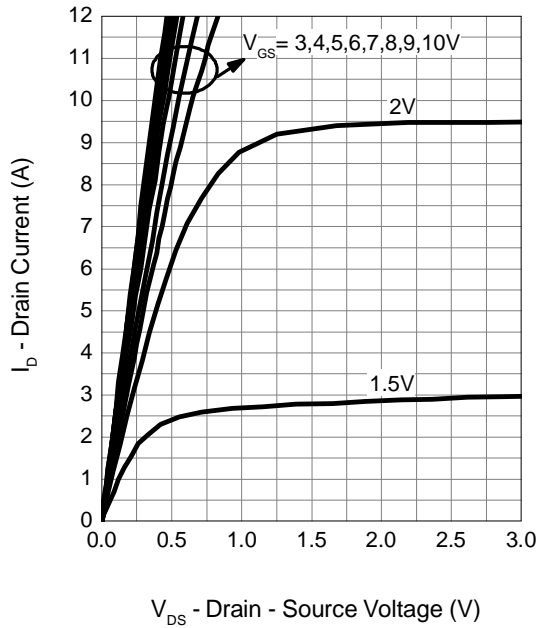
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### N-Channel Typical Operating Characteristics

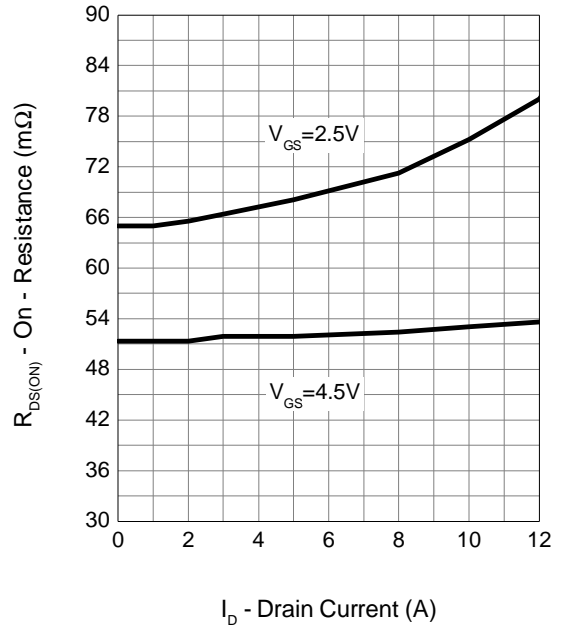


## N-Channel Typical Operating Characteristics

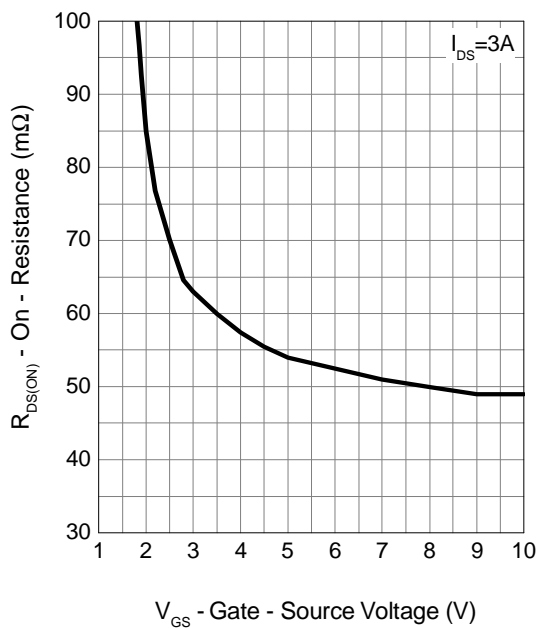
**Output Characteristics**



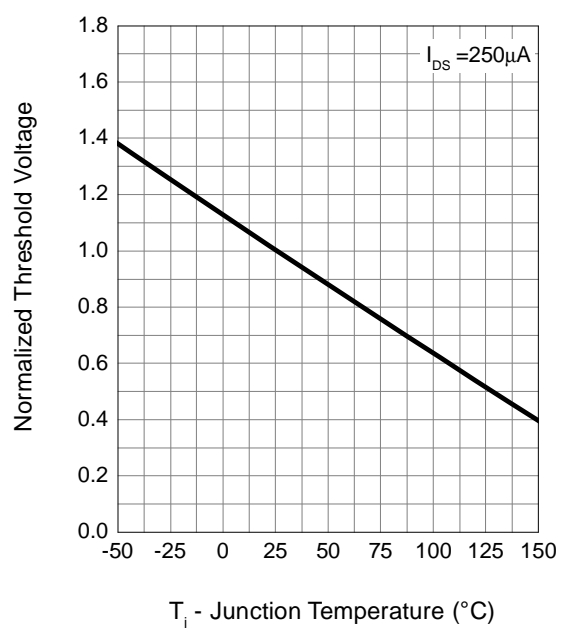
**Drain-Source On Resistance**



**Gate-Source On Resistance**

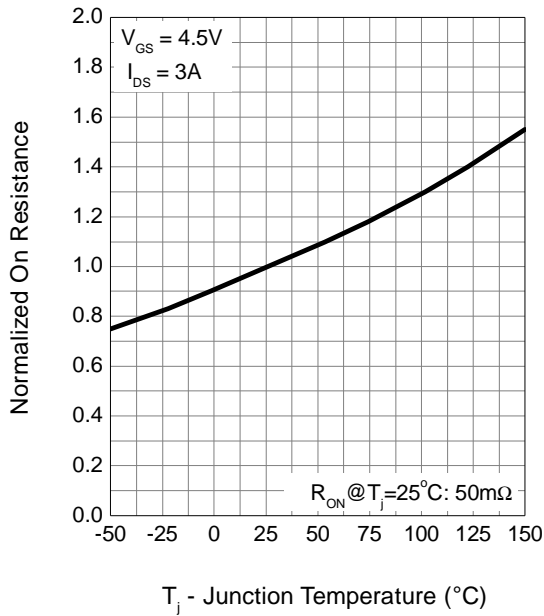


**Gate Threshold Voltage**

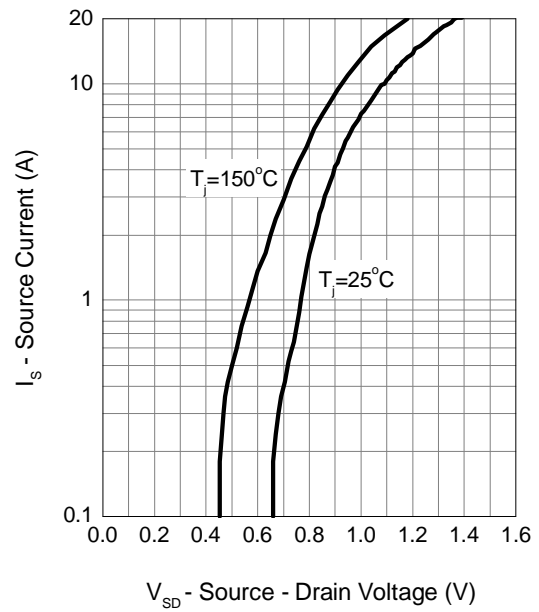


## N-Channel Typical Operating Characteristics

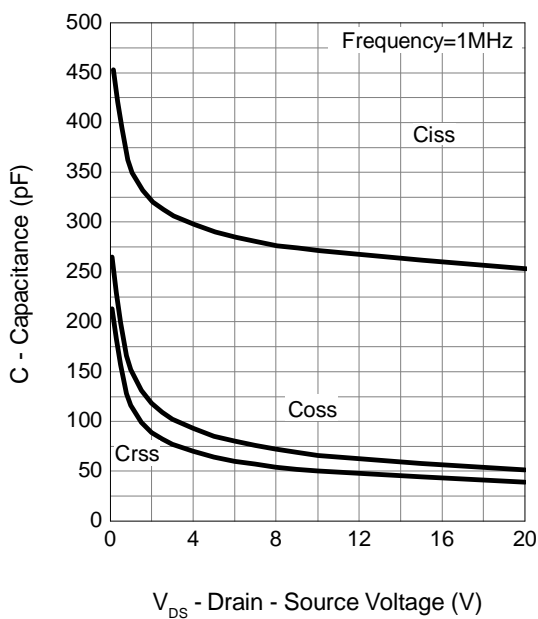
**Drain-Source On Resistance**



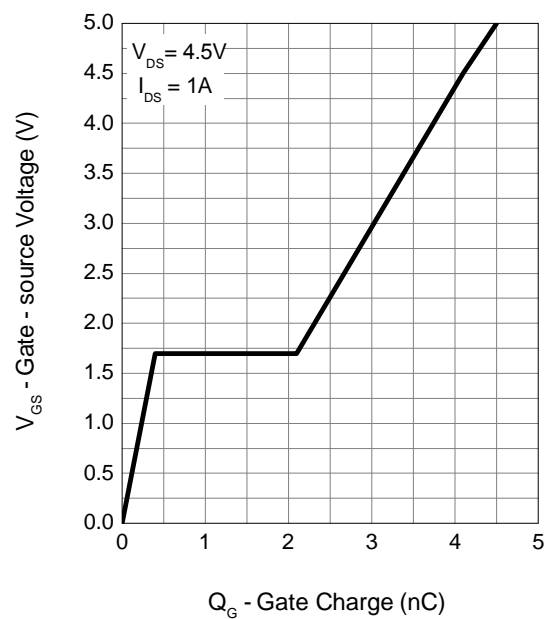
**Source-Drain Diode Forward**



**Capacitance**

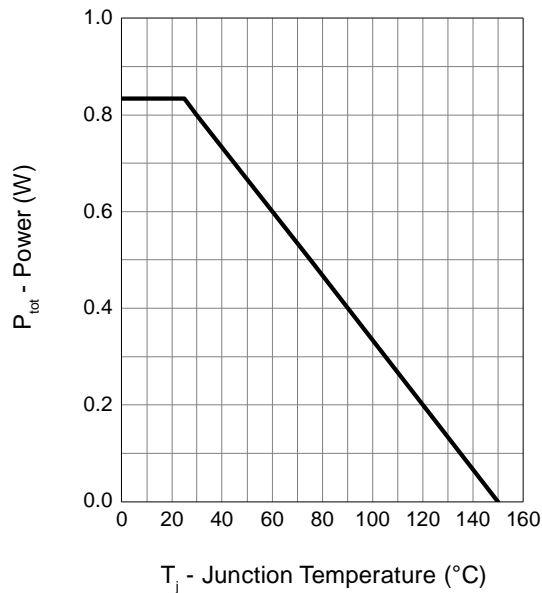


**Gate Charge**

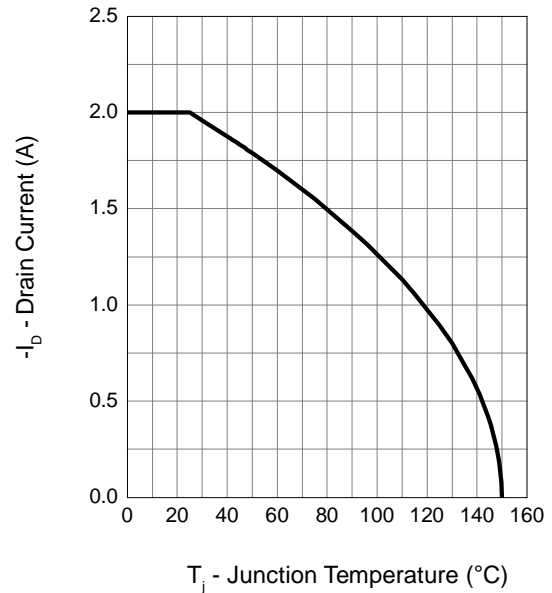


### P-Channel Typical Operating Characteristics

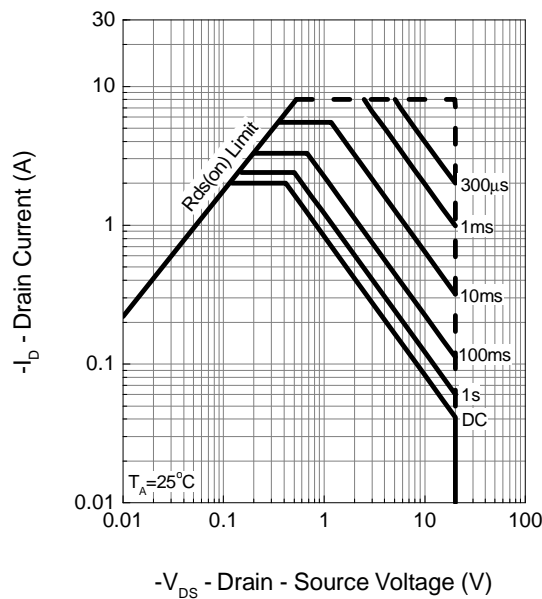
**Power Dissipation**



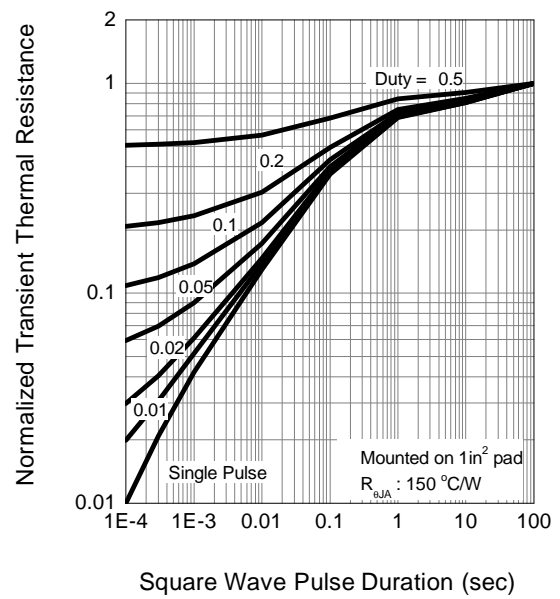
**Drain Current**



**Safe Operation Area**

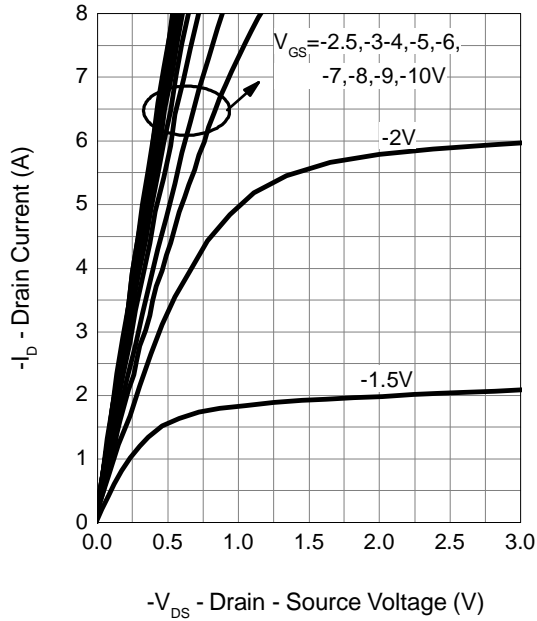


**Thermal Transient Impedance**

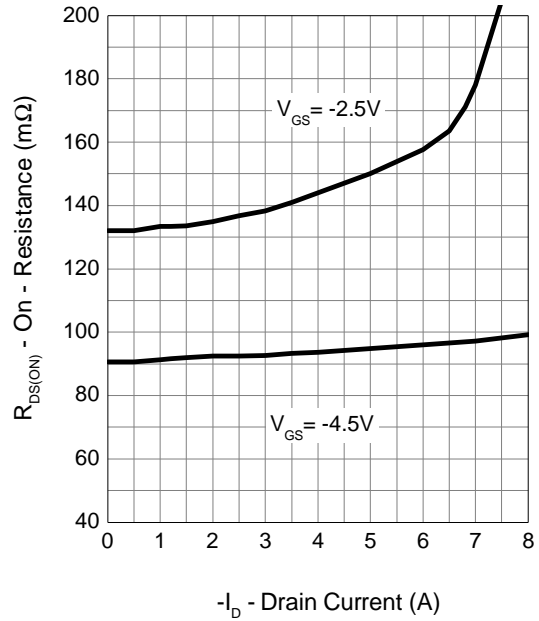


### P-Channel Typical Operating Characteristics

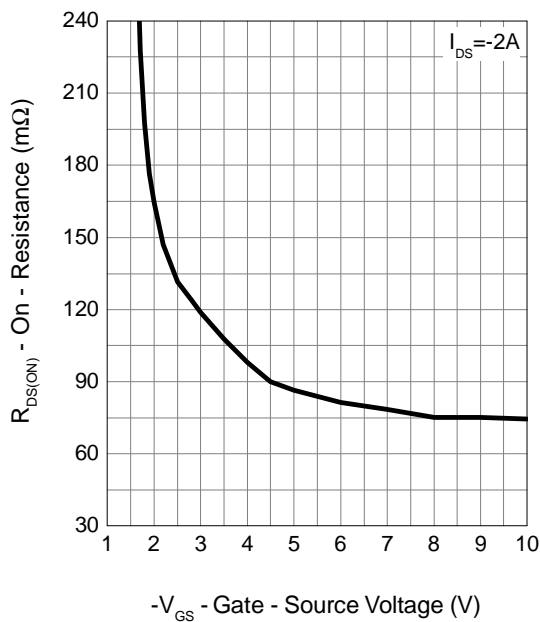
**Output Characteristics**



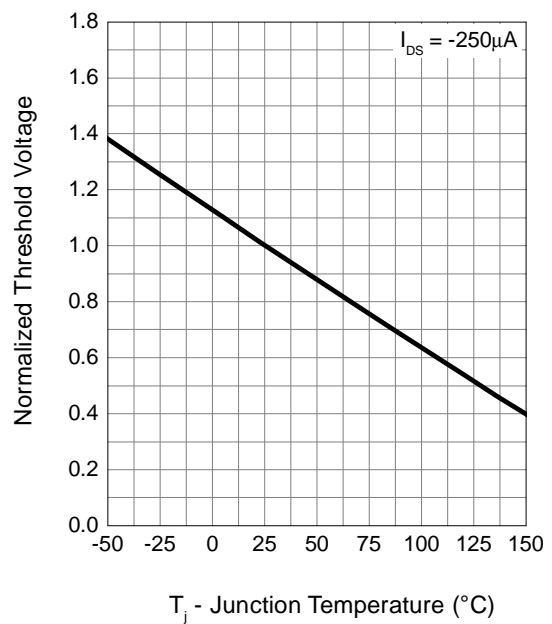
**Drain-Source On Resistance**



**Gate-Source On Resistance**



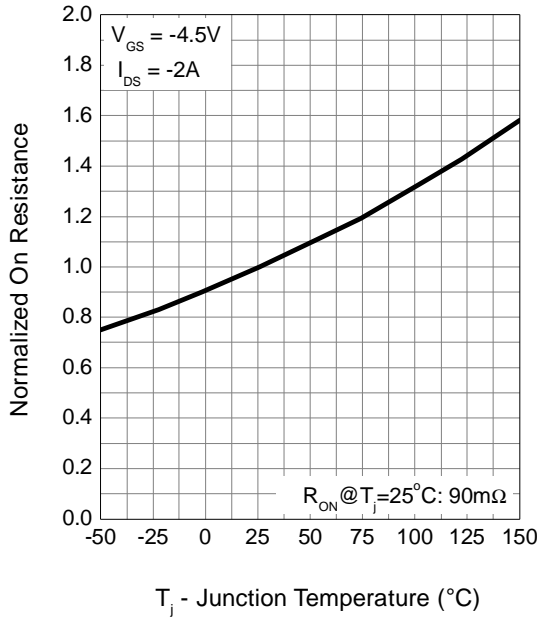
**Gate Threshold Voltage**



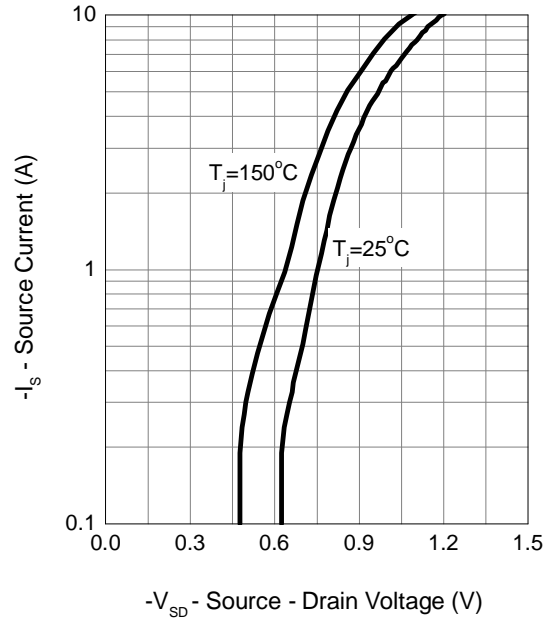


### P-Channel Typical Operating Characteristics

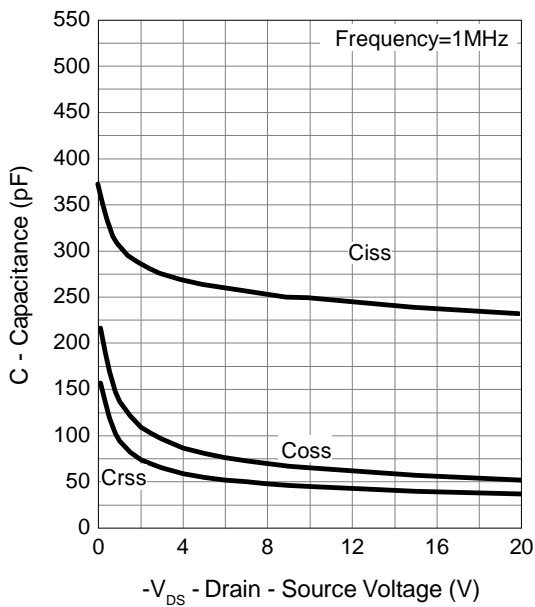
**Drain-Source On Resistance**



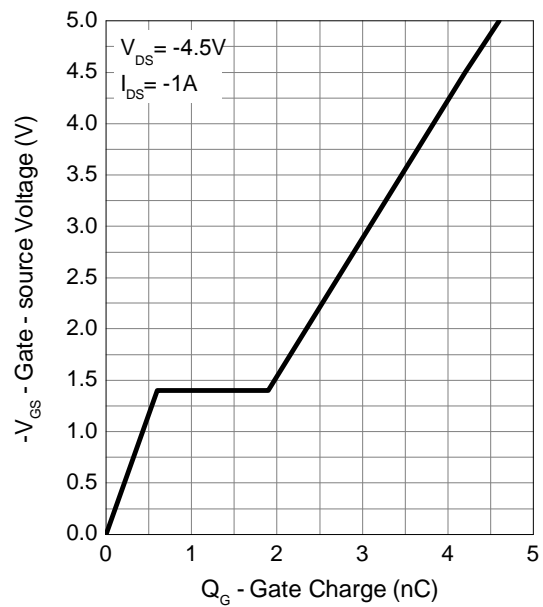
**Source-Drain Diode Forward**



**Capacitance**



**Gate Charge**





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