

General Description

The WSD2045DN22 is the highest performance trench N-Ch and P-Channel 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 WSD2045DN22 meet the RoHS and Green Product requirement with full function reliability approved.

Features

- 100% UIS + R_g Tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

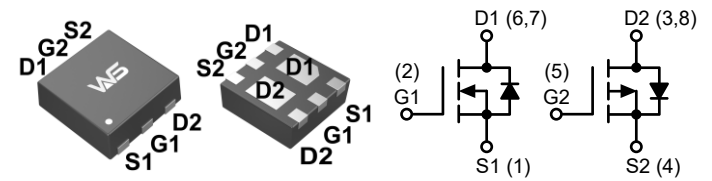
Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D
20V	20m Ω	10A
-20V	48m Ω	-8A

Applications

- Load Switch.
- Networking.

DFN2X2-6S Pin Configuration



Absolute Maximum Ratings ($T_A=25^\circ\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Rating		Units	
		N-Channel	P-Channel		
V_{DS}	Drain-Source Voltage	20	-20	V	
V_{GS}	Gate-Source Voltage	± 12	± 12		
I_D	Continuous Drain Current	$T_C=25^\circ\text{C}$	10	-8	A
I_{DM}^1	Pulse Drain Current	$T_C=25^\circ\text{C}$	30	-24	A
E_{AS}^3	Avalanche Energy, Single pulse	$L=0.5\text{mH}$	9	9	mJ
I_{AS}^3	Avalanche Current, Single pulse	$L=0.5\text{mH}$	6	-6	A
P_D	Power Dissipation	$T_C=25^\circ\text{C}$	16	17	W
		$T_C=70^\circ\text{C}$	9	10	
$R_{\theta JA}^2$	Thermal Resistance-Junction to Ambient	$t \leq 10\text{s}$	85		$^\circ\text{C/W}$
		Steady State	135		
T_{STG}	Storage Temperature Range	-55 to 150		$^\circ\text{C}$	
T_J	Maximum Junction Temperature	150			

N-Channel Electrical Characteristics ($T_A=25^\circ\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	20	---	---	V
$R_{DS(ON)}^4$	Drain-Source On-state Resistance	$V_{GS}=4.5V, I_D=4.5A$	---	20	24	m Ω
		$V_{GS}=2.5V, I_D=3.5A$	---	25	32	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	0.5	0.7	1.0	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=16V, V_{GS}=0V$ $T_J=85^\circ\text{C}$	---	---	1.0	μA
			---	---	30	
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	± 100	nA
R_G	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1.0\text{MHz}$	---	2.2	---	Ω
Q_g	Total Gate Charge	$V_{DS}=10V, V_{GS}=4.5V, I_{DS}=4.5A$	---	4.2	6.3	
Q_{gs}	Gate-Source Charge		---	0.3	---	
Q_{gd}	Gate-Drain Charge		---	1.7	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=10V, R_L=10\Omega, I_{DS}=1A,$ $V_{GEN}=10V, R_G=6\Omega$	---	2.4	---	ns
T_r	Turn-On Rise Time		---	13	---	
$T_{d(off)}$	Turn-Off Delay Time		---	15.5	---	
T_f	Turn-Off Fall Time		---	3	---	
C_{iss}	Input Capacitance	$V_{DS}=10V, V_{GS}=0V, f=1.0\text{MHz}$	---	275	358	pF
C_{oss}	Output Capacitance		---	61	---	
C_{rss}	Reverse Transfer Capacitance		---	52	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current	$T_C=25^\circ\text{C}$	---	---	10	A
V_{SD}^4	Diode Forward Voltage	$I_{SD}=1A, V_{GS}=0V$	---	0.7	1.0	V
t_{rr}	Reverse Recovery Time	$I_{SD}=4.5A, di_{SD}/dt=100A/\mu s$	---	12.8	---	ns
Q_{rr}	Reverse Recovery Charge		---	3.8	---	nC

Note:

1. Pulse width limited by max. junction temperature.
2. Surface mounted on 1in² pad area, steady state $t = 999s$.
3. UIS tested and pulse width limited by maximum junction temperature (initial temperature $T_J=25^\circ\text{C}$).
4. Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. Guaranteed by design, not subject to production testing.

P-Channel Electrical Characteristics ($T_A=25^\circ\text{C}$, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units	
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20	---	---	V	
$R_{DS(ON)}^4$	Drain-Source On-state Resistance	$V_{GS}=-4.5V, I_D=-2.5A$	---	48	56	m Ω	
		$V_{GS}=-2.5V, I_D=-2A$	---	66	78		
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-0.5	-0.7	-1.0	V	
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=-16V, V_{GS}=0V$	---	---	-1.0	μA	
		$T_J=85^\circ\text{C}$	---	---	-30		
I_{GSS}	Gate Leakage Current	$V_{GS}=\pm 10V, V_{DS}=0V$	---	---	± 100	nA	
R_G	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1.0\text{MHz}$	---	10.8	---	Ω	
Q_g	Total Gate Charge	$V_{DS}=-10V, V_{GS}=-4.5V, I_{DS}=-2.5A$	---	4.6	---		
Q_{gs}	Gate-Source Charge		---	0.5	---		
Q_{gd}	Gate-Drain Charge		---	1.9	---		
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-10V, R_L=10\Omega, I_{DS}=-1A$	---	6	---	ns	
T_r	Turn-On Rise Time		---	14.4	---		
$T_{d(off)}$	Turn-Off Delay Time		$V_{GEN}=-4.5V, R_G=6\Omega$	---	26		---
T_f	Turn-Off Fall Time		---	24	---		
C_{iss}	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, f=1.0\text{MHz}$	---	365	---	pF	
C_{oss}	Output Capacitance		---	75	---		
C_{rss}	Reverse Transfer Capacitance		---	60	---		

Diode Characteristics

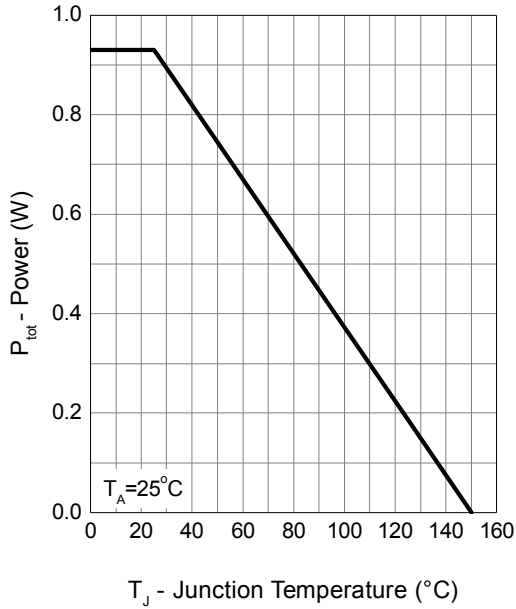
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I_S	Continuous Source Current	$T_C=25^\circ\text{C}$	---	---	-10	A
V_{SD}^4	Diode Forward Voltage	$I_{SD}=-1A, V_{GS}=0V$	---	-0.8	-1.2	V
t_{rr}	Reverse Recovery Time	$I_{SD}=-2.5A, di_{SD}/dt=100A/\mu s$	---	22	---	ns
Q_{rr}	Reverse Recovery Charge		---	6.0	---	nC

Note:

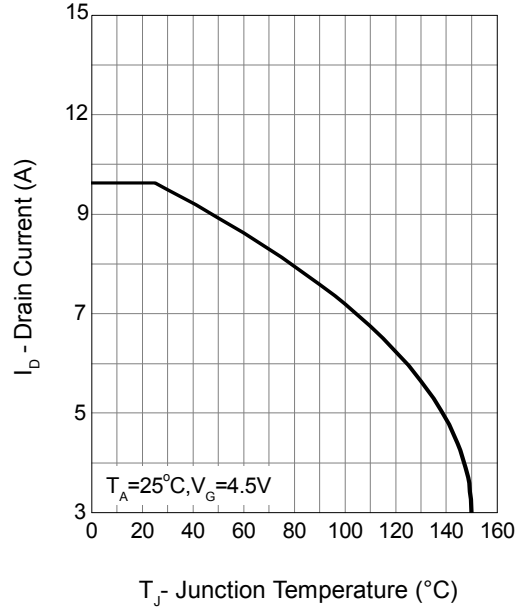
1. Pulse width limited by max. junction temperature.
2. Surface mounted on 1in² pad area, steady state $t = 999s$.
3. UIS tested and pulse width limited by maximum junction temperature (initial temperature $T_J=25^\circ\text{C}$).
4. Pulse test ; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

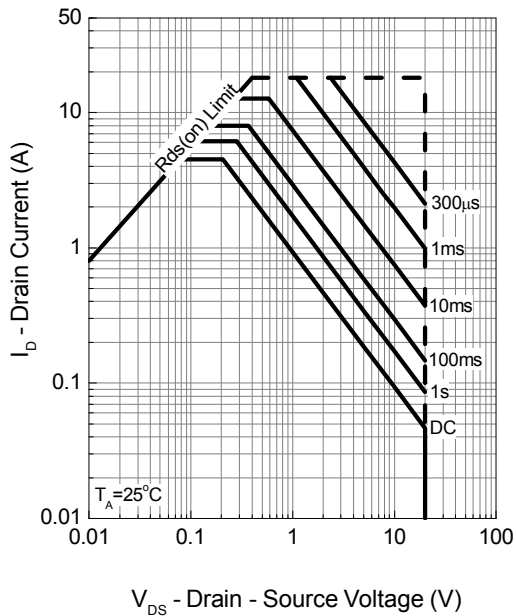
Power Dissipation



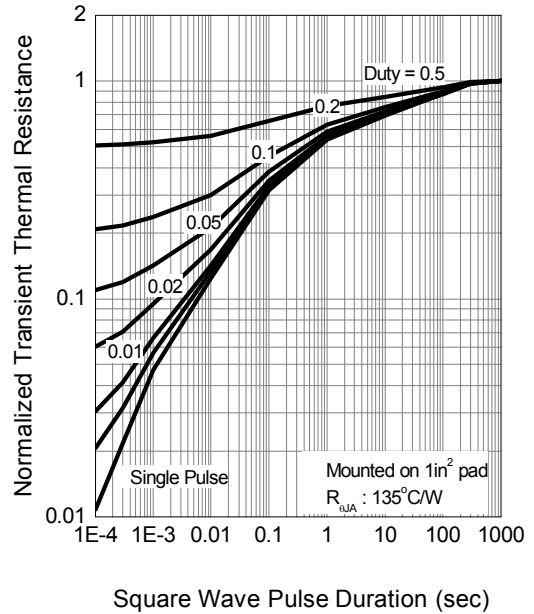
Drain Current



Safe Operation Area

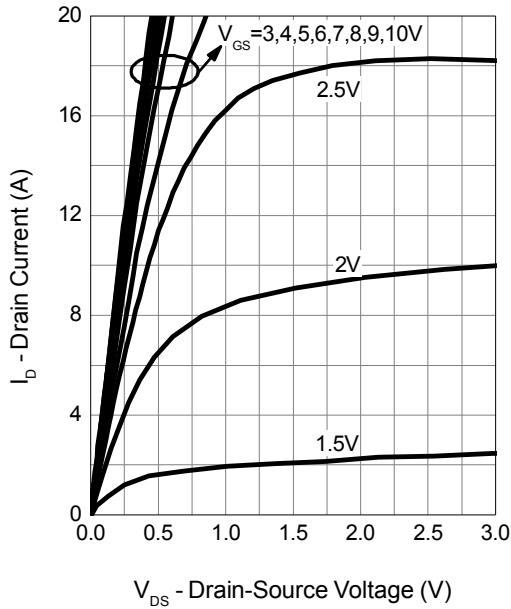


Thermal Transient Impedance

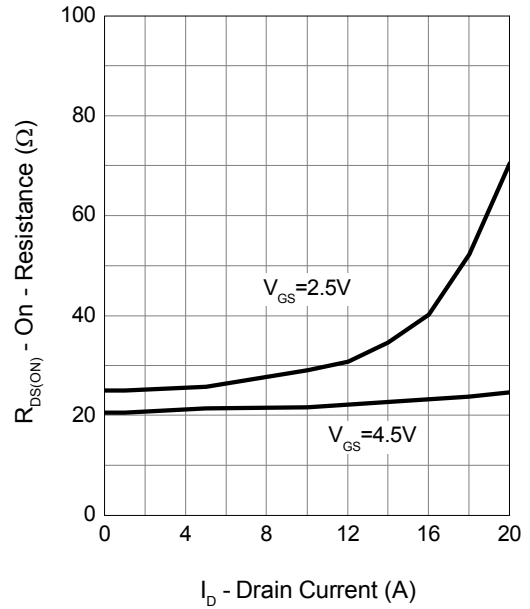


N-Channel Typical Characteristics (Cont.)

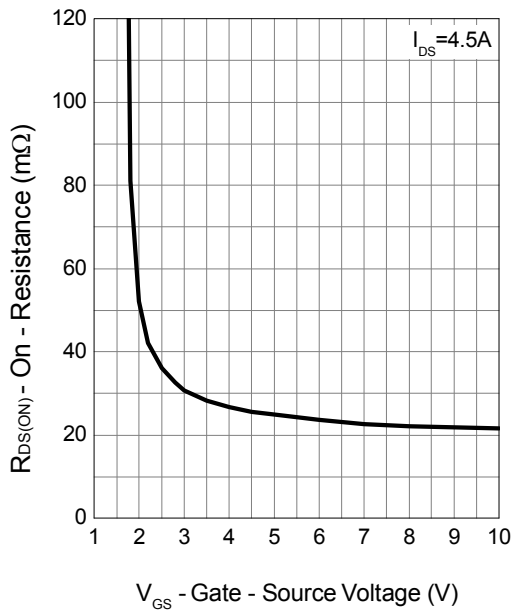
Output Characteristics



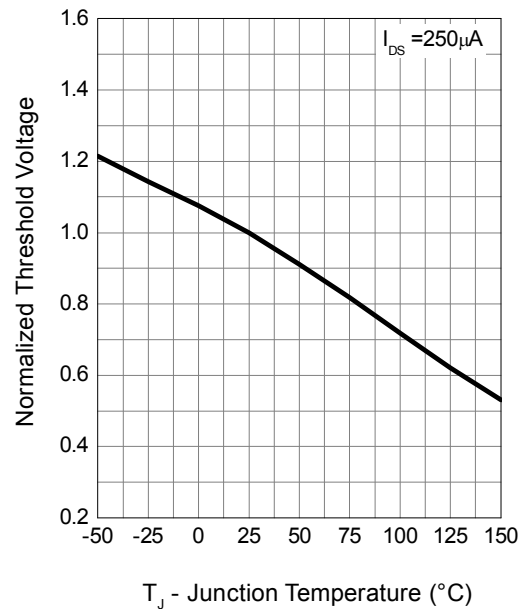
Drain-Source On Resistance



Transfer Characteristics

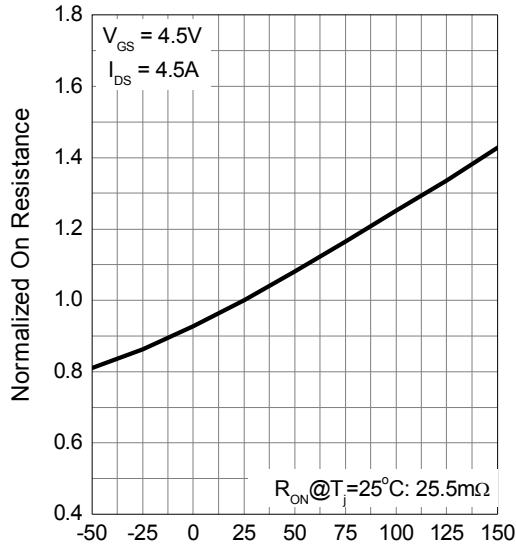


Gate Threshold Voltage



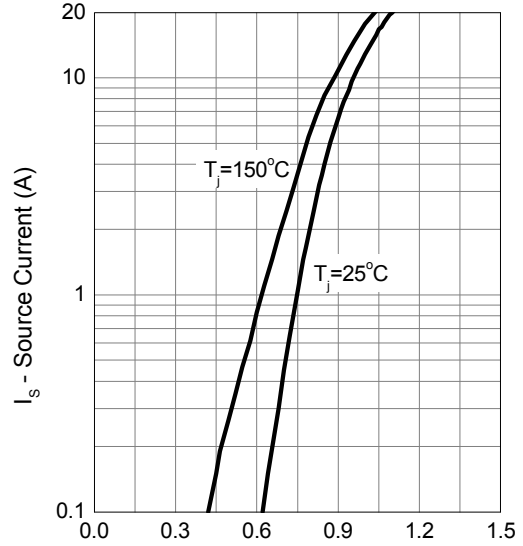
N-Channel Typical Characteristics (Cont.)

Drain-Source On Resistance



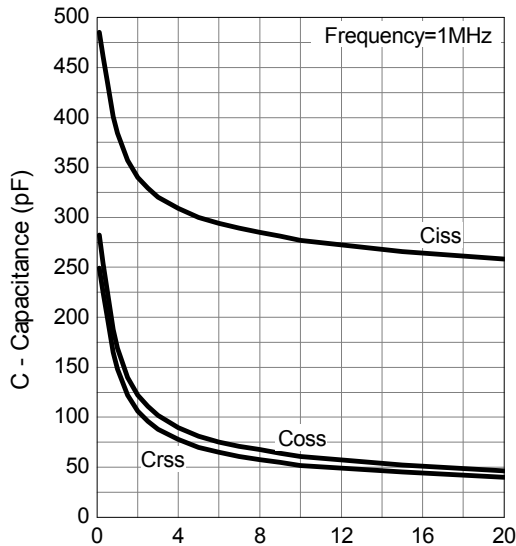
T_j - Junction Temperature ($^\circ C$)

Source-Drain Diode Forward



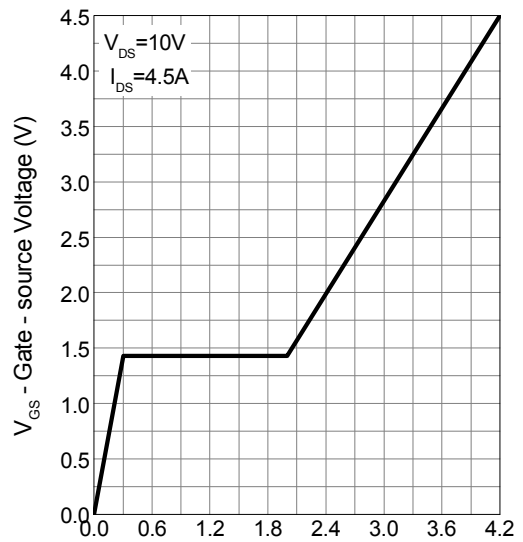
V_{SD} - Source - Drain Voltage (V)

Capacitance



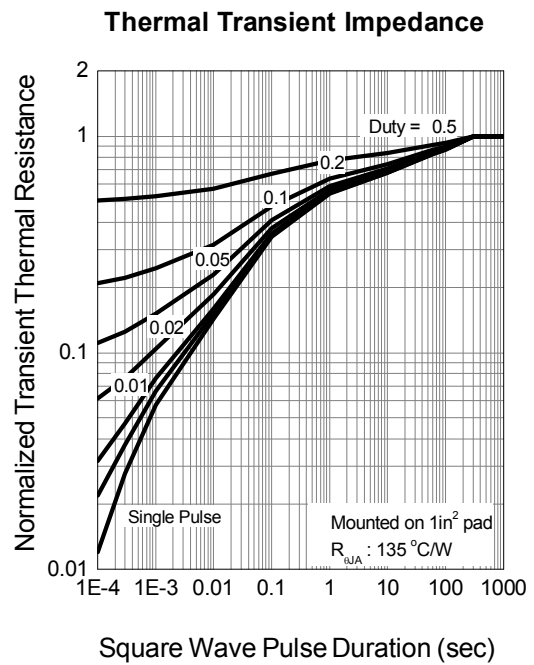
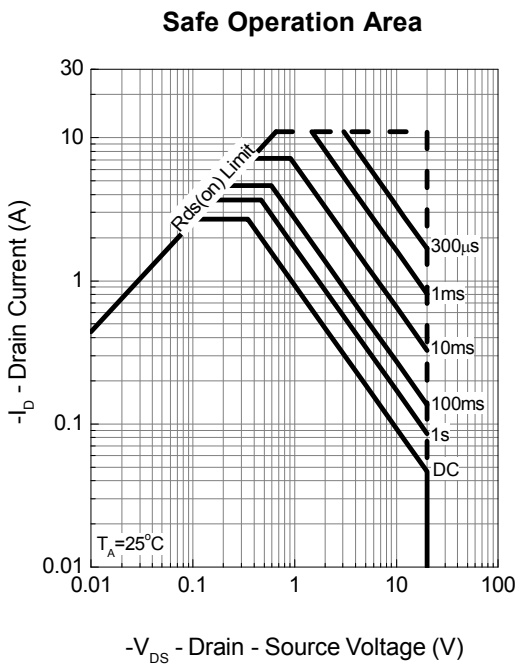
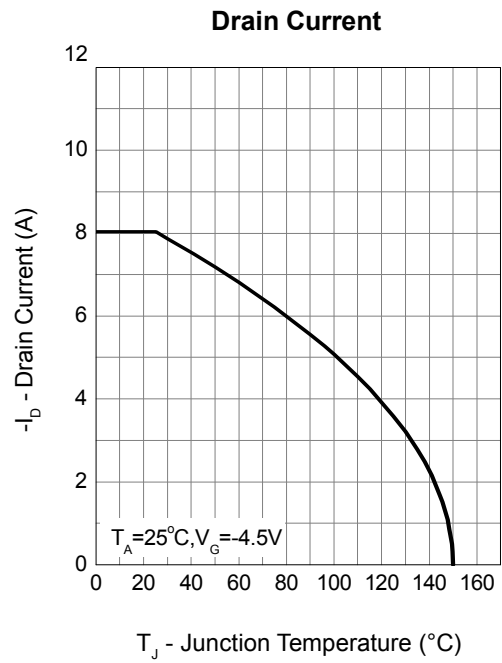
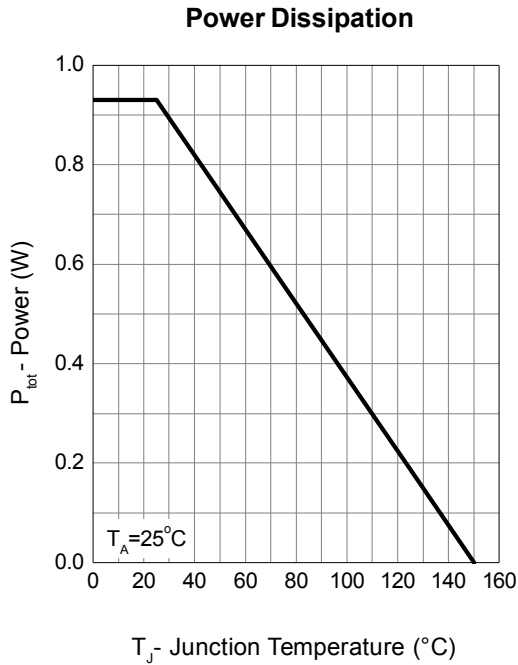
V_{DS} - Drain - Source Voltage (V)

Gate Charge



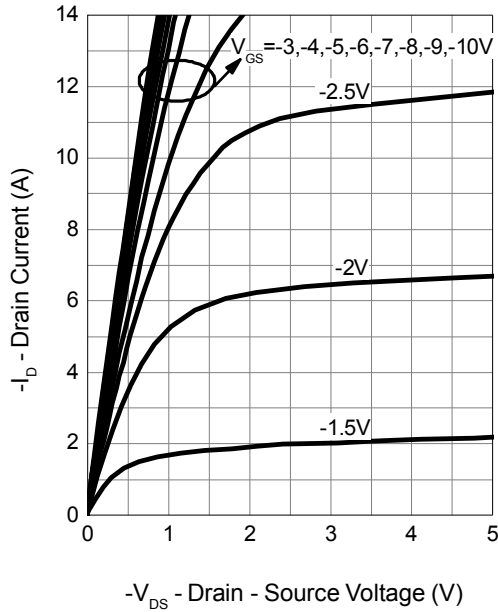
Q_G - Gate Charge (nC)

P-Channel Typical Characteristics

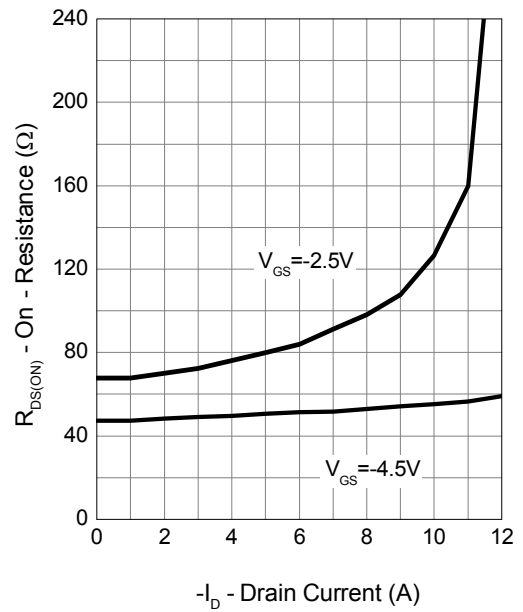


P-Channel Typical Characteristics (Cont.)

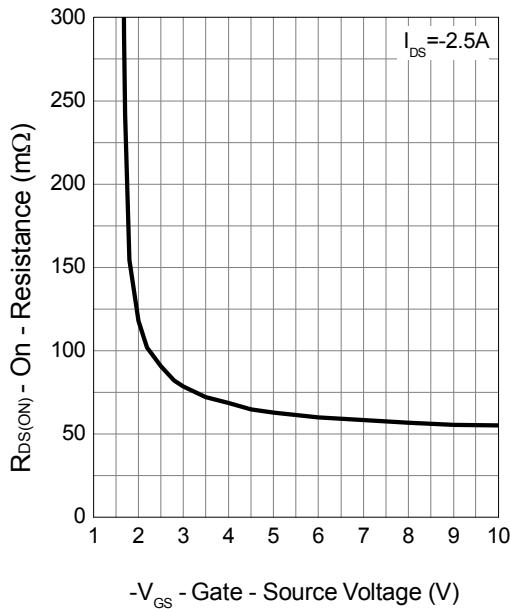
Output Characteristics



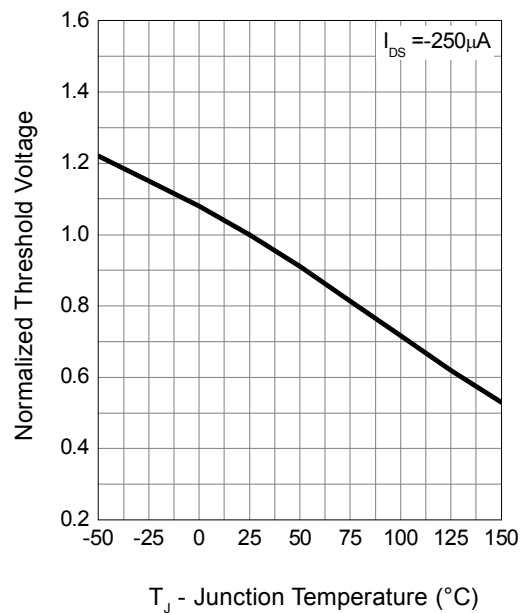
Drain-Source On Resistance



Transfer Characteristics

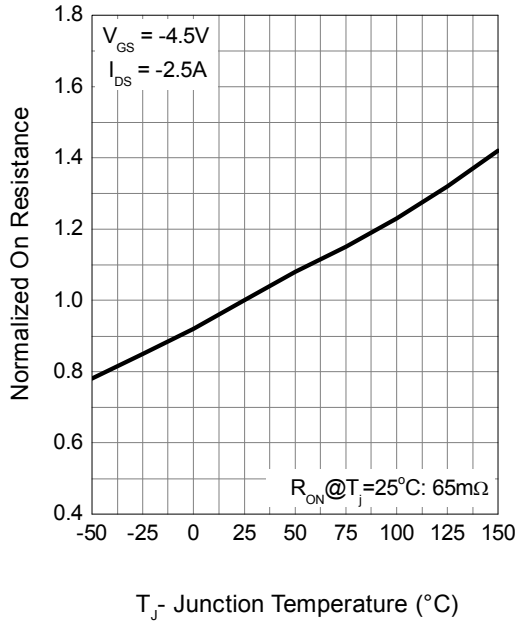


Gate Threshold Voltage

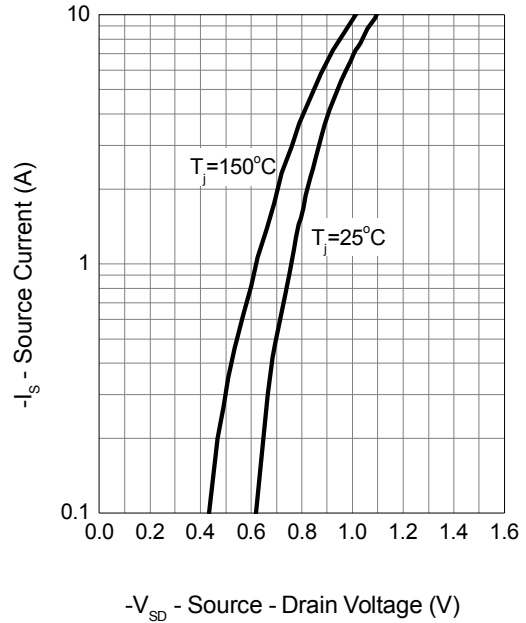


P-Channel Typical Characteristics (Cont.)

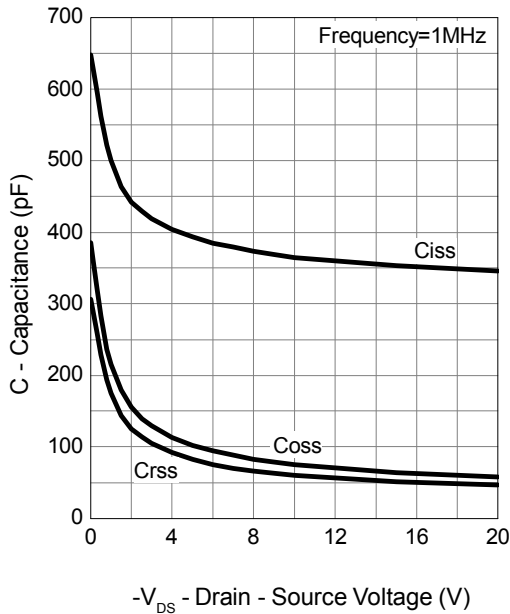
Drain-Source On Resistance



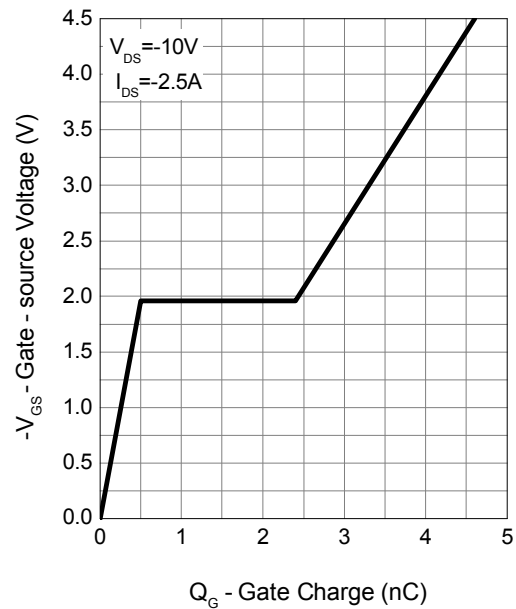
Source-Drain Diode Forward

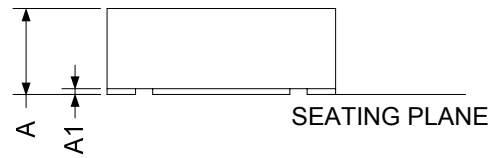
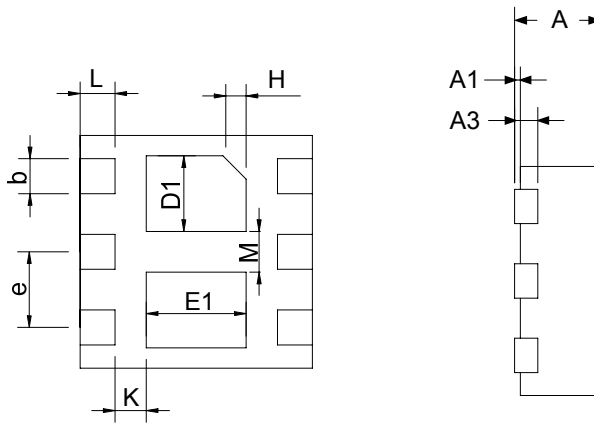
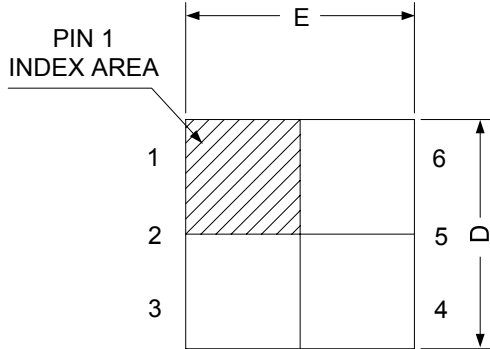


Capacitance

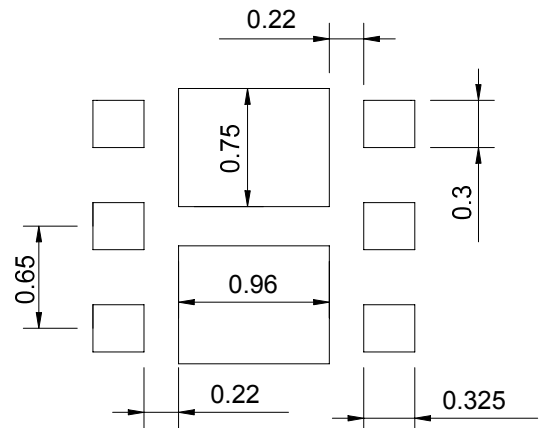


Gate Charge



Packaging information


SYMBOL	DFN2X2-6S			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	0.80	0.028	0.031
A1	0.00	0.05	0.000	0.002
A3	0.200 REF		0.008 REF	
b	0.25	0.35	0.010	0.014
D	1.90	2.10	0.075	0.083
D1	0.55	0.75	0.022	0.030
E	1.90	2.10	0.075	0.083
E1	0.76	0.96	0.030	0.038
e	0.65 BSC		0.026 BSC	
H	0.20 BSC		0.008 BSC	
K	0.17	0.37	0.007	0.015
L	0.25	0.35	0.010	0.014
M	0.25	0.45	0.010	0.018

RECOMMENDED LAND PATTERN


UNIT: mm

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