

General Description

The WSD23N10DN 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 synchronous buck converter applications.

The WSD23N10DN meet the RoHS and Green Product requirement 100% EAS guaranteed with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

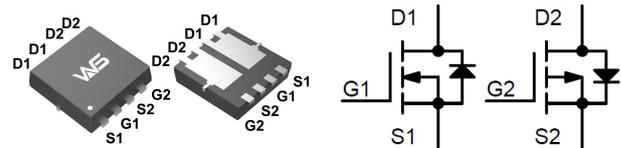
Product Summary

BVDSS	RDSON	ID
100V	100mΩ	12A
-100V	150mΩ	-12A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- CCFL Back-light Inverter

DFN3.3x3.3-8-EP Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage	100	-100	V
V_{GS}	Gate-Source Voltage	± 20	± 20	V
I_D	Continuous Drain Current, $V_{GS(NP)}=10V, T_c=25^\circ C$	12	-12	A
	Continuous Drain Current, $V_{GS(NP)}=10V, T_c=100^\circ C$	4.8	-4.8	A
I_{DP}^a	Pulse Drain Current Tested, $V_{GS(NP)}=10V$	36	-36	A
E_{AS}^c	Avalanche Energy, Single pulse, L=0.5mH	6.25	20	mJ
I_{AS}^c	Avalanche Current, Single pulse, L=0.5mH	5	-9	A
P_D	Total Power Dissipation, $T_a=25^\circ C$	17.8	17.8	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	150	150	$^\circ C$
$R_{\theta JA}^b$	Thermal Resistance-Junction to Ambient, Steady State	85	85	$^\circ C/W$
$R_{\theta JC}$	Thermal Resistance-Junction to Case, Steady State	6.25	6.25	$^\circ C/W$

Note * : Max. current is limited by bonding wire.

Note a : Pulse width limited by max. junction temperature.

Note b : $R_{\theta JA}$ steady state $t=999s$. $R_{\theta JA}$ is measured with the device mounted on $1in^2$, FR-4 board with 2oz. Copper.

Note c : UIS tested and pulse width limited by maximum junction temperature $175^\circ C$ (initial temperature $T_J=25^\circ C$).

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	100	---	---	V
R _{DS(ON)} ^d	Static Drain-Source On-Resistance	V _{GS} =10V, I _D =4A	---	100	110	mΩ
		V _{GS} =4.5V, I _D =3A	---	110	150	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250uA	1.3	1.8	2.5	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =20V, V _{GS} =0V, T _J =25°C	---	---	1	uA
		V _{DS} =20V, V _{GS} =0V, T _J =85°C	---	---	30	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	2.5	3.6	Ω
Q _g ^e	Total Gate Charge	V _{DS} =50V, V _{GS} =10V, I _{DS} =4A	---	10	---	nC
Q _{gs} ^e	Gate-Source Charge		---	2.5	---	
Q _{gd} ^e	Gate-Drain Charge		---	3.3	---	
T _{d(on)} ^e	Turn-On Delay Time	V _{DD} =30V, R _L =30R, I _{DS} =1A, V _{GEN} =10V , R _G =6R.	---	9	---	ns
T _r ^e	Rise Time		---	7	---	
T _{d(off)} ^e	Turn-Off Delay Time		---	19	---	
T _f ^e	Fall Time		---	5	---	
C _{iss} ^e	Input Capacitance	V _{DS} =30V, V _{GS} =0V, f=1MHz	---	445	---	pF
C _{oss} ^e	Output Capacitance		---	31	---	
C _{rss} ^e	Reverse Transfer Capacitance		---	15	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current	V _G =V _D =0V, Force Current	---	---	15	A
V _{SD} ^d	Diode Forward Voltage	V _{GS} =0V, I _S =5A, T _J =25°C	---	---	1.3	V

Note d : Pulse test ; pulse width≤300μs, duty cycle≤2%.

Note e : Guaranteed by design, not subject to production testing.

P-Channel Electrical Characteristics ($T_J=25^\circ\text{C}$, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-100	---	---	V
$R_{DS(ON)}^d$	Static Drain-Source On-Resistance	$V_{GS}=-10V, I_D=-3A$	---	150	180	m Ω
		$V_{GS}=-4.5V, I_D=-2A$	---	170	210	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.3	-1.8	-2.3	V
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	μA
		$V_{DS}=-20V, V_{GS}=0V, T_J=85^\circ\text{C}$	---	---	-30	
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	± 100	nA
Q_g^e	Total Gate Charge	$V_{DS}=-50V, V_{GS}=-4.5V, I_D=-3A$	---	16	---	nC
Q_{gs}^e	Gate-Source Charge		---	2.5	---	
Q_{gd}^e	Gate-Drain Charge		---	3.5	---	
$T_{d(on)}^e$	Turn-On Delay Time	$V_{DD}=-30V, V_{GS}=-10V, R_G=6\Omega, I_D=-1A, R_L=15\Omega,$	---	9	---	ns
T_r^e	Rise Time		---	5	---	
$T_{d(off)}^e$	Turn-Off Delay Time		---	50	---	
T_f^e	Fall Time		---	30	---	
C_{iss}^e	Input Capacitance	$V_{DS}=-30V, V_{GS}=0V, f=1\text{MHz}$	---	700	---	pF
C_{oss}^e	Output Capacitance		---	50	---	
C_{rss}^e	Reverse Transfer Capacitance		---	28	---	

Diode Characteristics

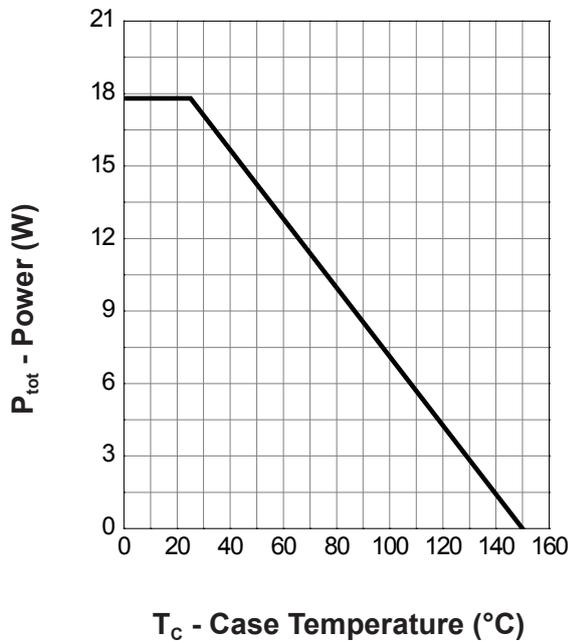
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	-12	A
V_{SD}^e	Diode Forward Voltage	$V_{GS}=0V, I_S=-3A, T_J=25^\circ\text{C}$	---	---	-1.2	V

Note d : Pulse test; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

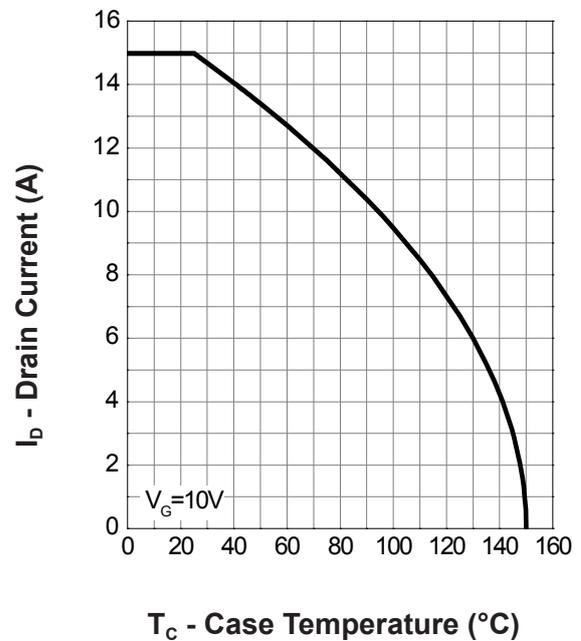
Note e : Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

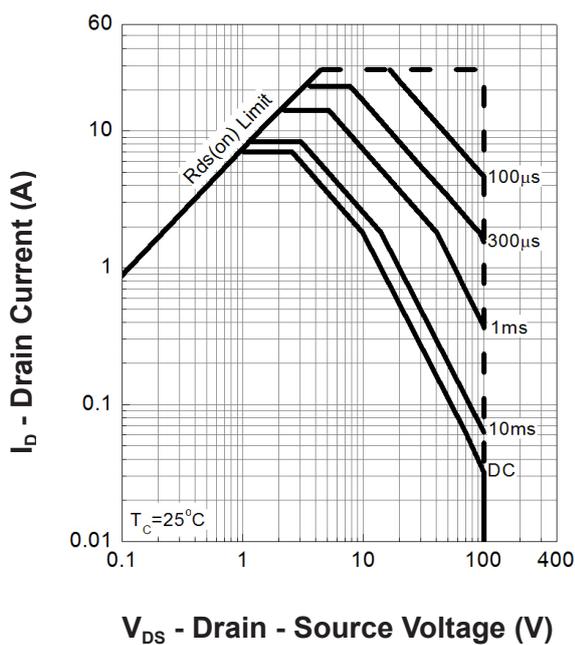
Power Dissipation



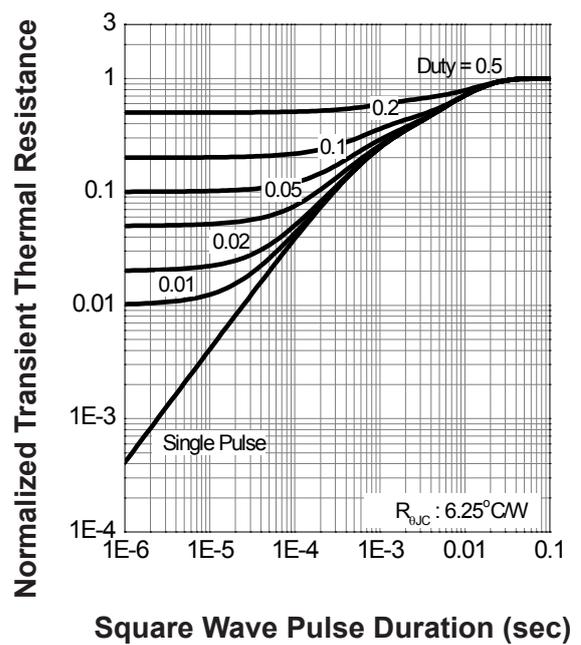
Drain Current



Safe Operation Area

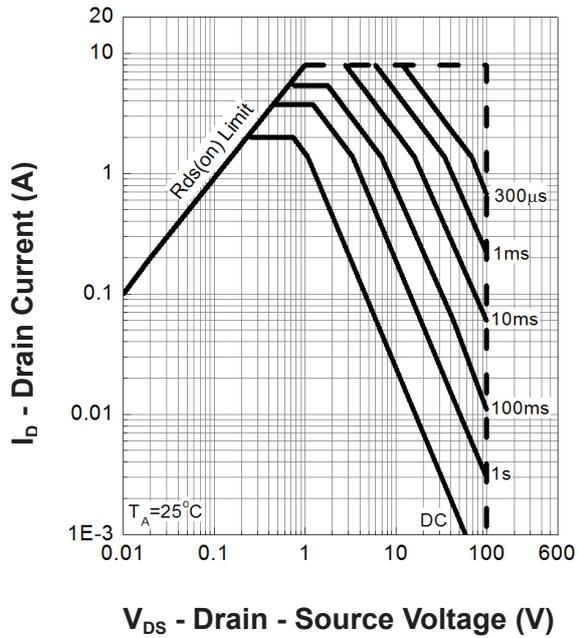


Thermal Transient Impedance

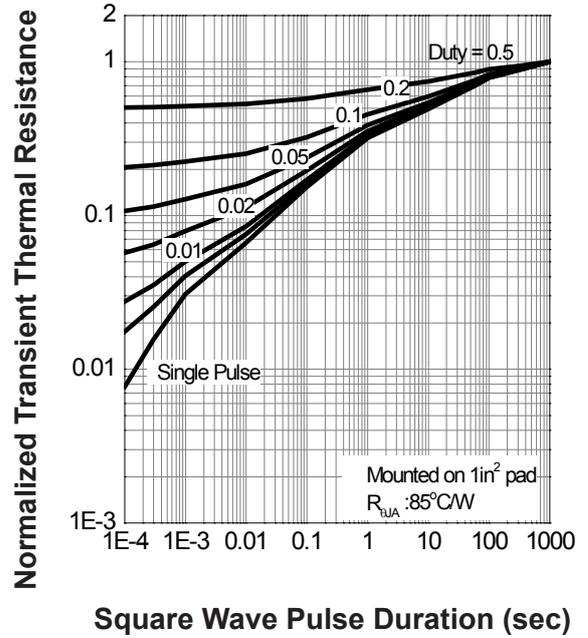


N-Channel Typical Characteristics

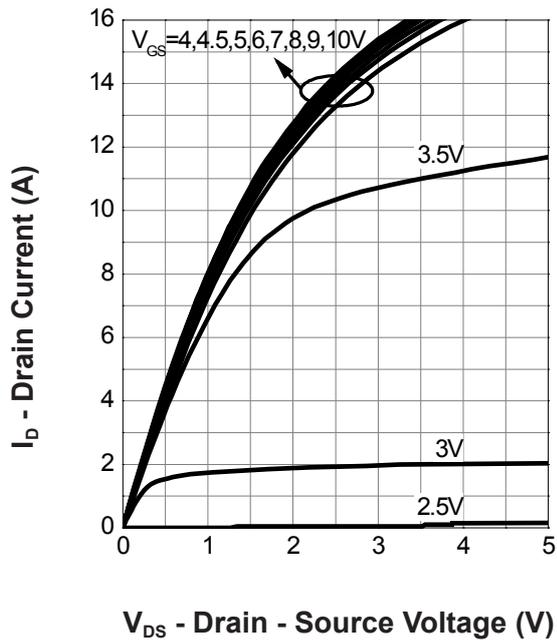
Safe Operation Area



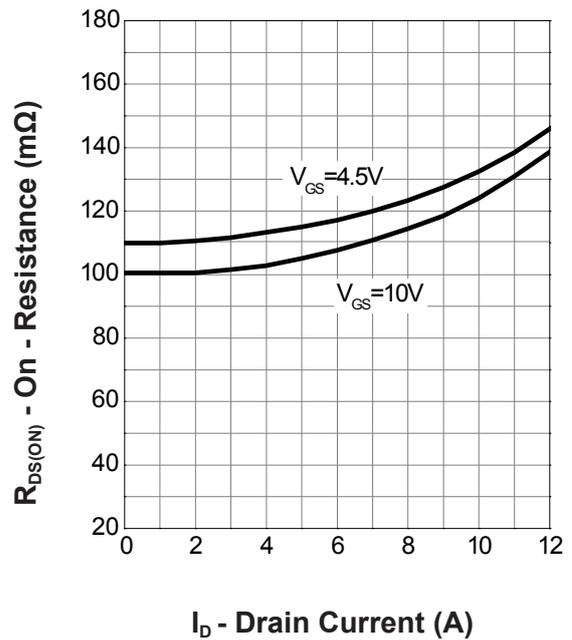
Thermal Transient Impedance



Output Characteristics

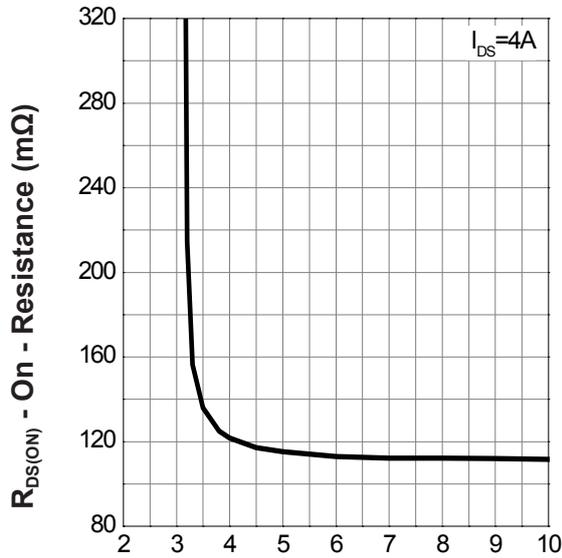


Drain-Source On Resistance



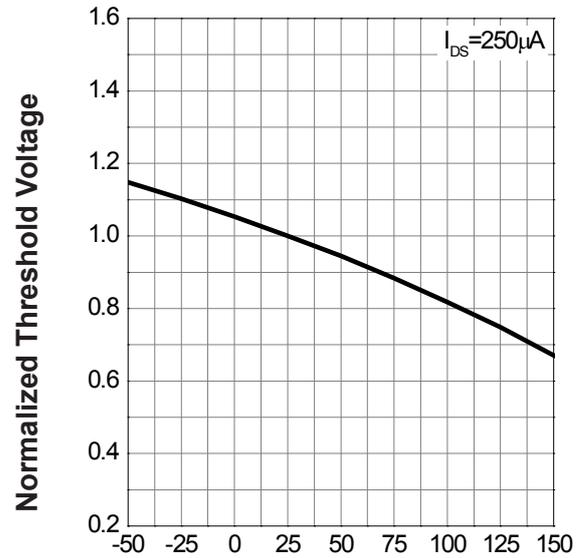
N-Channel Typical Characteristics

Gate-Source On Resistance



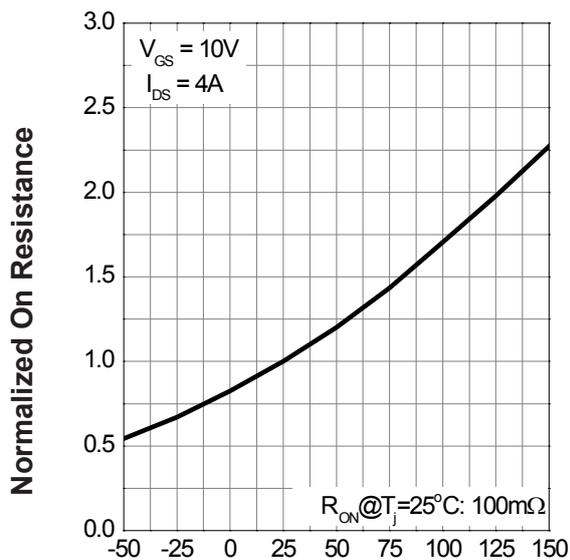
V_{GS} - Gate - Source Voltage (V)

Gate Threshold Voltage



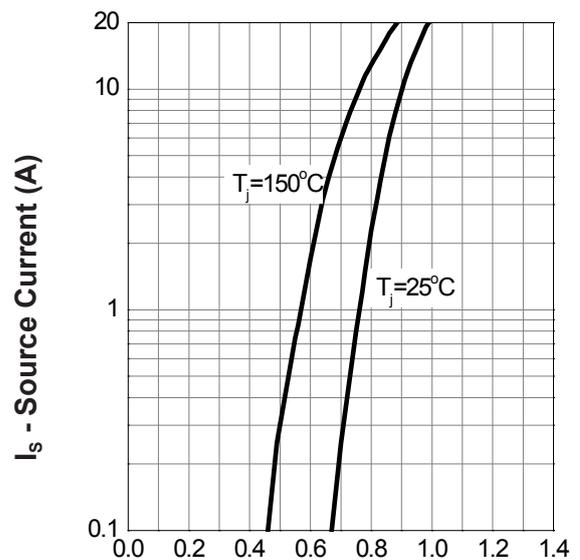
T_J - Junction Temperature (°C)

Drain-Source On Resistance



T_J - Junction Temperature (°C)

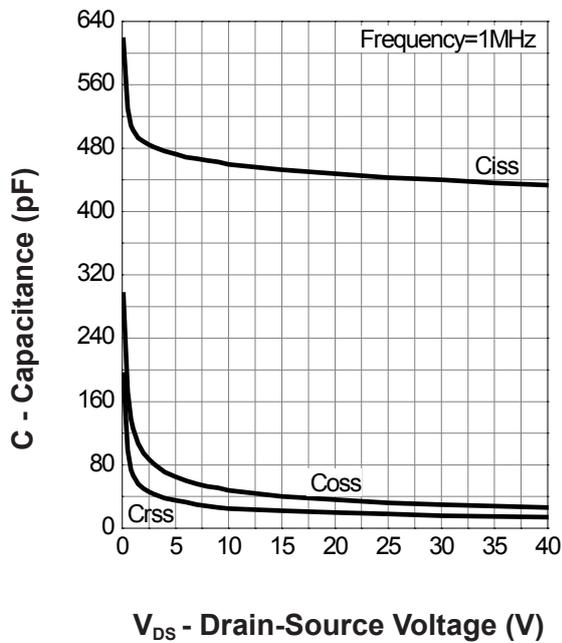
Source-Drain Diode Forward



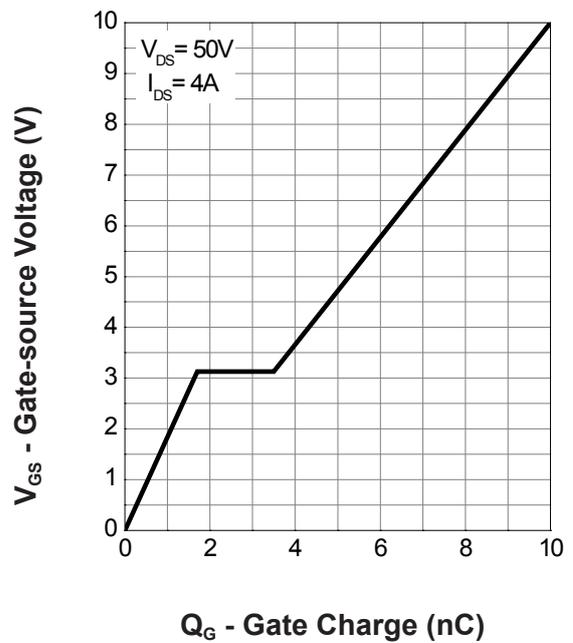
V_{SD} - Source - Drain Voltage (V)

N-Channel Typical Characteristics

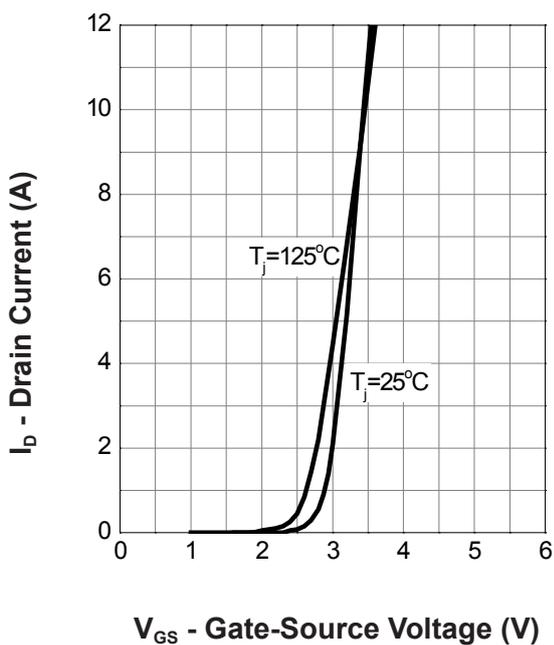
Capacitance



Gate Charge

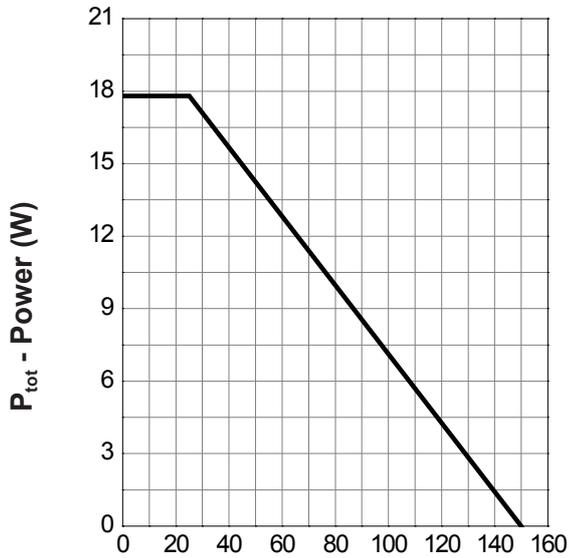


Transfer Characteristics



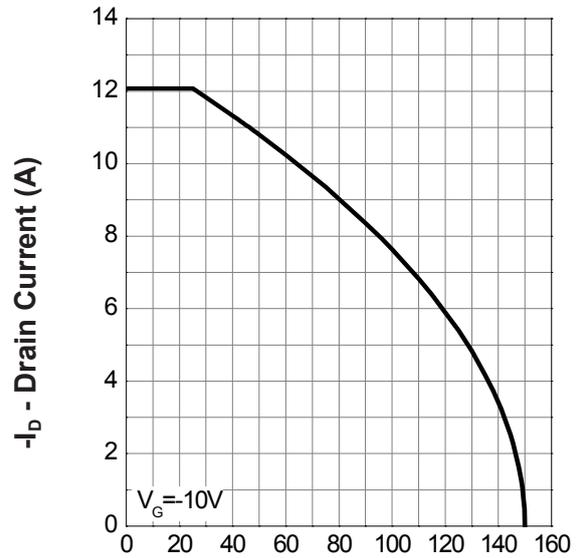
P-Channel Typical Characteristics

Power Dissipation



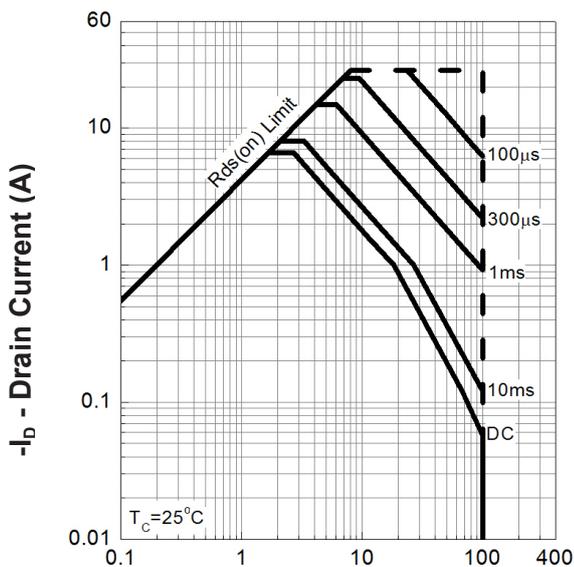
T_c - Case Temperature (°C)

Drain Current



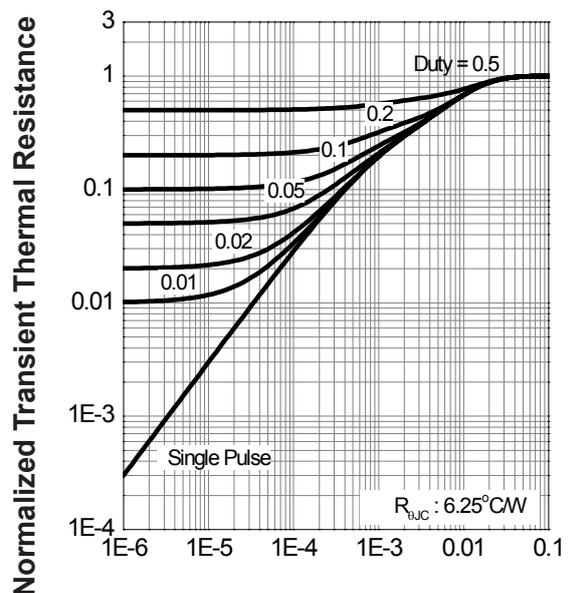
T_c - Case Temperature (°C)

Safe Operation Area



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

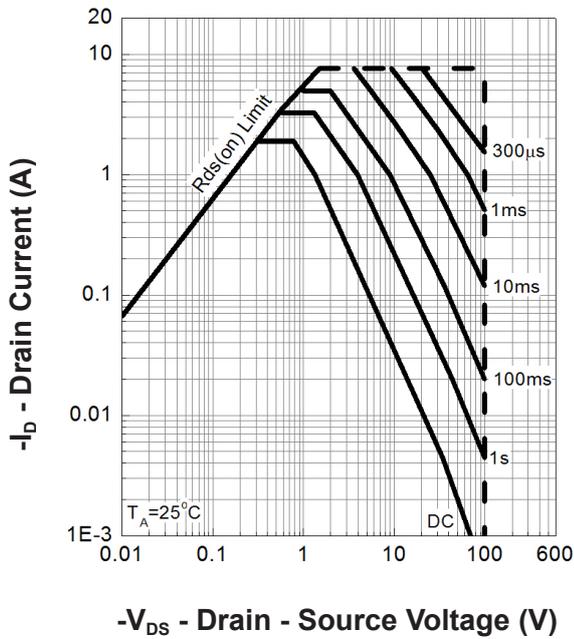
Thermal Transient Impedance



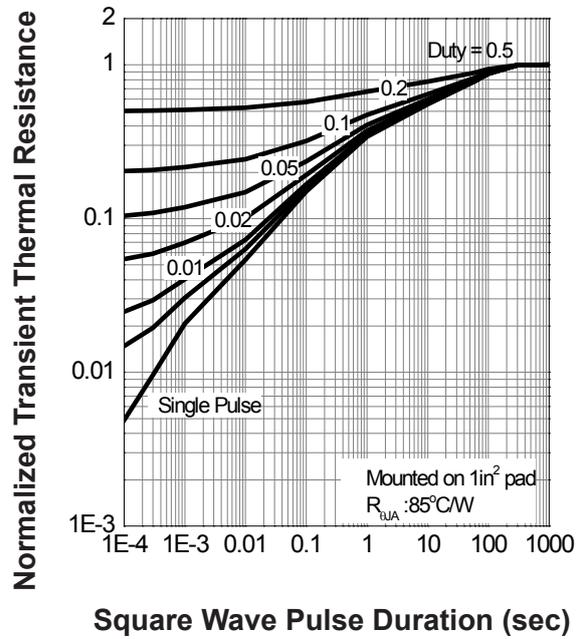
Square Wave Pulse Duration (sec)

P-Channel Typical Characteristics

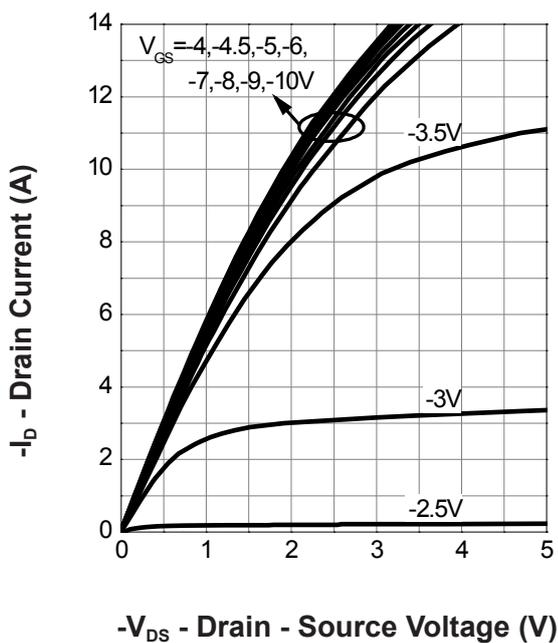
Safe Operation Area



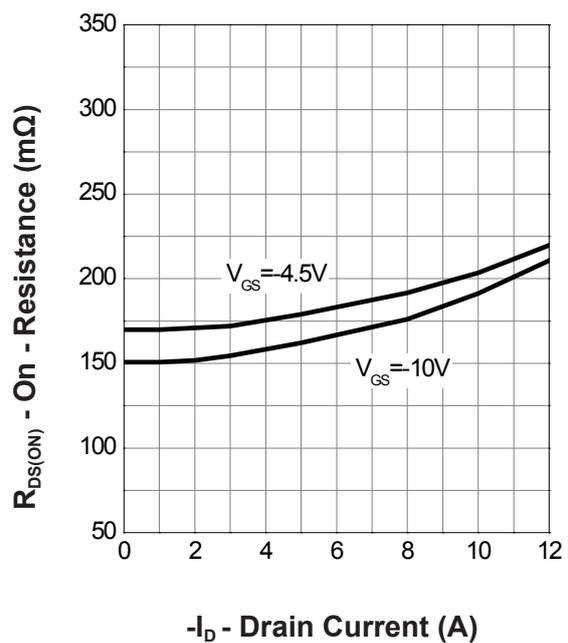
Thermal Transient Impedance



Output Characteristics

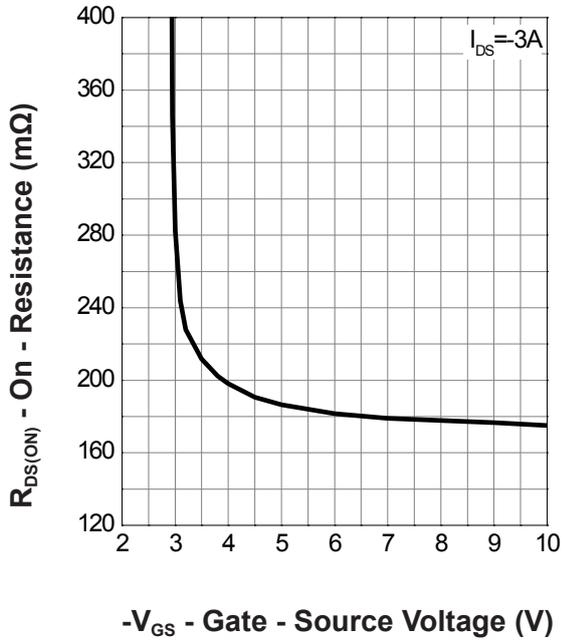


Drain-Source On Resistance

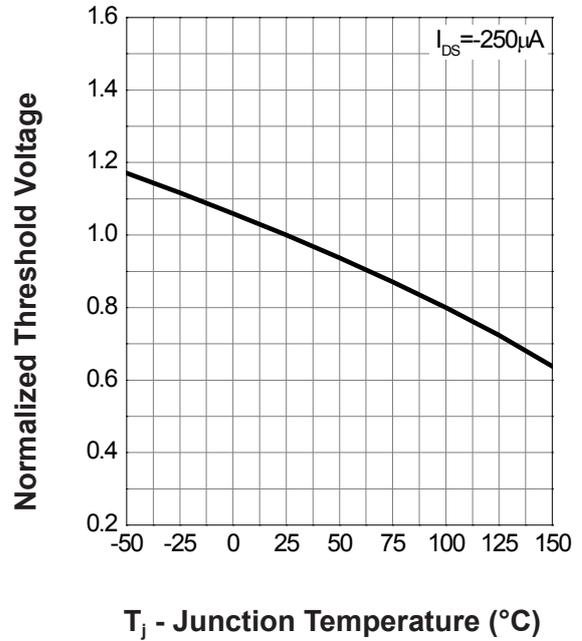


P-Channel Typical Characteristics

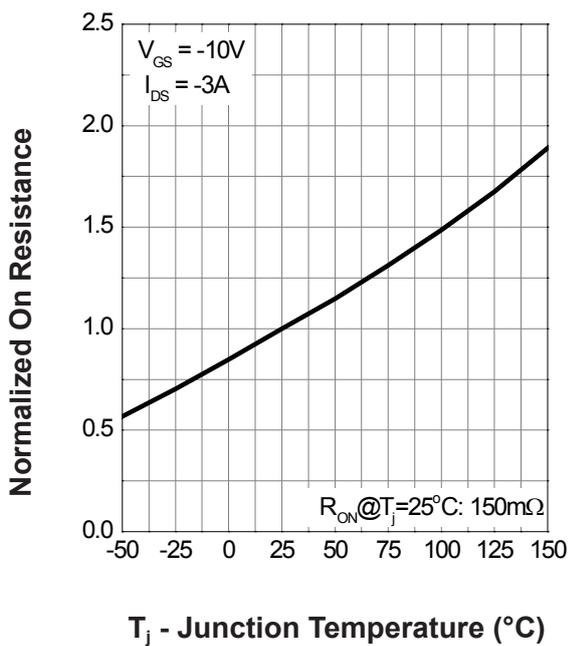
Gate-Source On Resistance



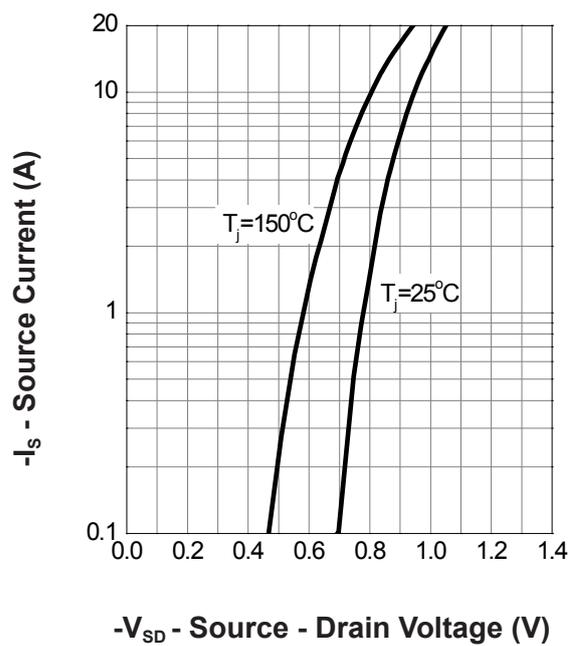
Gate Threshold Voltage



Drain-Source On Resistance

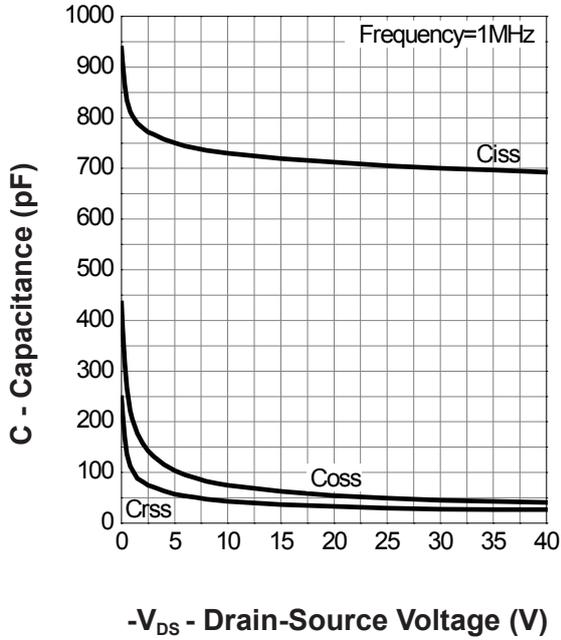


Source-Drain Diode Forward

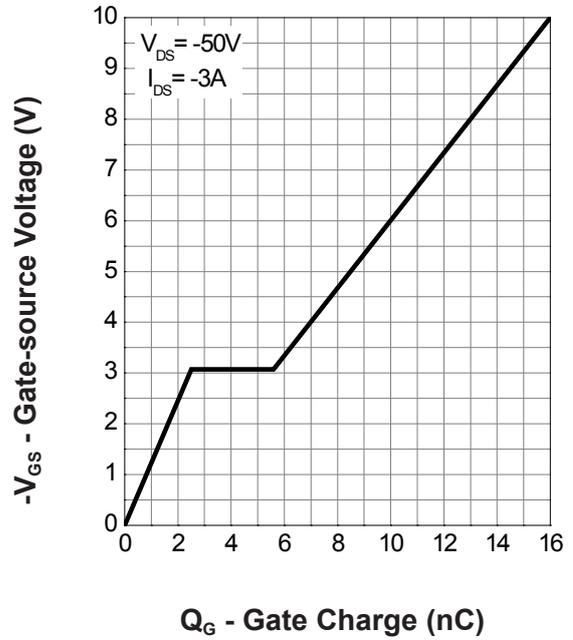


P-Channel Typical Characteristics

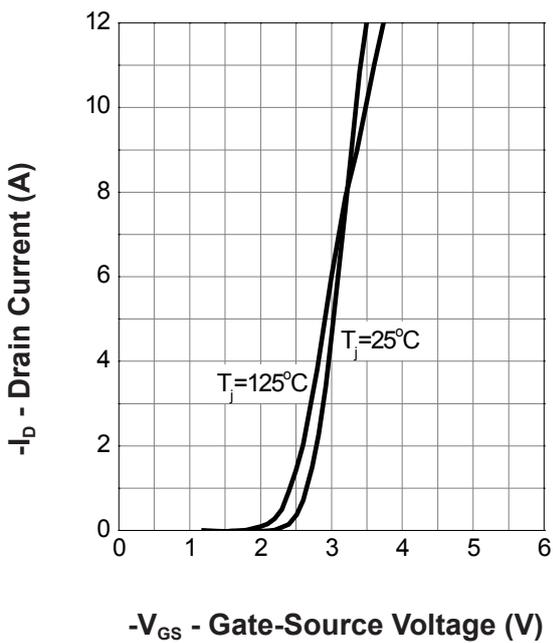
Capacitance



Gate Charge



Transfer Characteristics





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