WSF3013

N-Ch and P-Channel MOSFET

General Description

The WSF3013 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 WSF3013 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

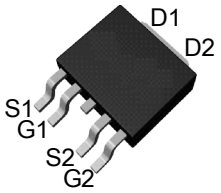
Product Summery

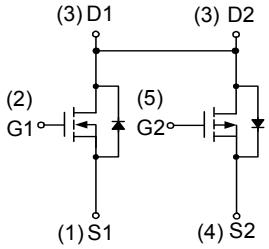
BVDSS	RDSON	ID
30V	14mΩ	12A
-30V	23mΩ	-11.5A

Applications

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

TO-252-4L Pin Configuration





Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
V_{DS}	Drain-Source Voltage	30	-30	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D	Continuous Drain Current, $V_{GS(NP)}$=10V,T_a=25℃	12*	-11.5	A
	Continuous Drain Current, $V_{GS(NP)}$=10V,T_a=70℃	7.5	-9.6	A
I_{DP} [a]	Pulse Drain Current Tested, $V_{GS(NP)}$=10V	488	-48	A
E_{AS} [c]	Avalanche Energy, Single pulse , L=0.5mH	20	20	mJ
I_{AS} [c]	Avalanche Current, Single pulse , L=0.5mH	9	-9	A
P_D	Total Power Dissipation, T_a=25℃	5.25	5.25	W
T_{STG}	Storage Temperature Range	-55 to 175	-55 to 175	℃
T_J	Operating Junction Temperature Range	175	175	℃
$R_{\theta JA}$ [b]	Thermal Resistance-Junction to Ambient,Steady State	60	60	℃/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case,Steady State	6.25	6.25	℃/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°C (initial temperature T_j=25°C).

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	30	---	---	V
$R_{DS(ON)}$[d]	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=8A	---	14	18.5	mΩ
		V_{GS}=4.5V , I_D=5A	---	17	25	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.3	1.8	2.3	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=20V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=20V , V_{GS}=0V , T_J=85℃	---	---	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	---	1.7	3.4	Ω
Q_g[e]	Total Gate Charge	V_{DS}=15V, V_{GS}=4.5V, I_{DS}=8A	---	5.2	---	nC
Q_{gs}[e]	Gate-Source Charge		---	1.0	---	
Q_{gd}[e]	Gate-Drain Charge		---	2.8	---	
$T_{d(on)}$[e]	Turn-On Delay Time	V_{DD}=15V,R_L=15R, I_{DS}=1A,V_{GEN}=10V, R_G=6R.	---	6	---	ns
T_r[e]	Rise Time		---	8.6	---	
$T_{d(off)}$[e]	Turn-Off Delay Time		---	16	---	
T_f[e]	Fall Time		---	3.6	---	
C_{iss}[e]	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	545	---	pF
C_{oss}[e]	Output Capacitance		---	95	---	
C_{rss}[e]	Reverse Transfer Capacitance		---	55	---	

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}[d]	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1.2	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 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-30	---	---	V
$R_{DS(ON)}$[d]	Static Drain-Source On-Resistance	V_{GS}=-10V , I_D=-12A	---	23	32.5	mΩ
		V_{GS}=-4.5V , I_D=-5A	---	32	42	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.3	-1.8	-2.3	V
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-20V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-20V , V_{GS}=0V , T_J=85℃	---	---	-30	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
Q_g[e]	Total Gate Charge	V_{DS}=-15V , V_{GS}=-4.5V , I_D=-12A	---	13	---	nC
Q_{gs}[e]	Gate-Source Charge		---	1.0	---	
Q_{gd}[e]	Gate-Drain Charge		---	4.0	---	
$T_{d(on)}$[e]	Turn-On Delay Time	V_{DD}=-15V , V_{GS}=-10V , R_G=6Ω, I_D=-1A ,R_L=15Ω,	---	8.7	---	ns
T_r[e]	Rise Time		---	10	---	
$T_{d(off)}$[e]	Turn-Off Delay Time		---	22	---	
T_f[e]	Fall Time		---	9.0	---	
C_{iss}[e]	Input Capacitance	V_{DS}=-15V , V_{GS}=0V , f=1MHz	---	580	---	pF
C_{oss}[e]	Output Capacitance		---	105	---	
C_{rss}[e]	Reverse Transfer Capacitance		---	72	---	

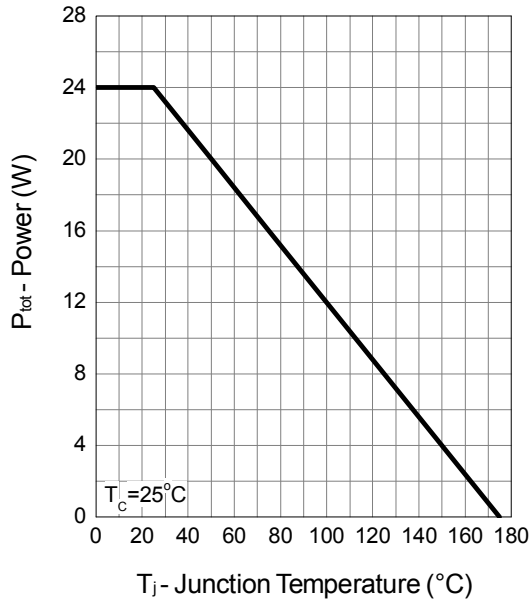
Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	V_G=V_D=0V , Force Current	---	---	-10	A
V_{SD}[e]	Diode Forward Voltage	V_{GS}=0V , I_S=-1A , T_J=25℃	---	---	-1.2	V

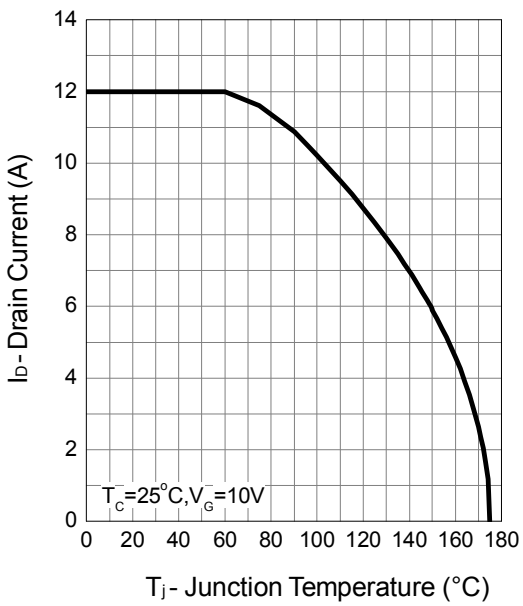
Note d：Pulse test; pulse width≤300μs, duty cycle≤2%.
Note e：Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

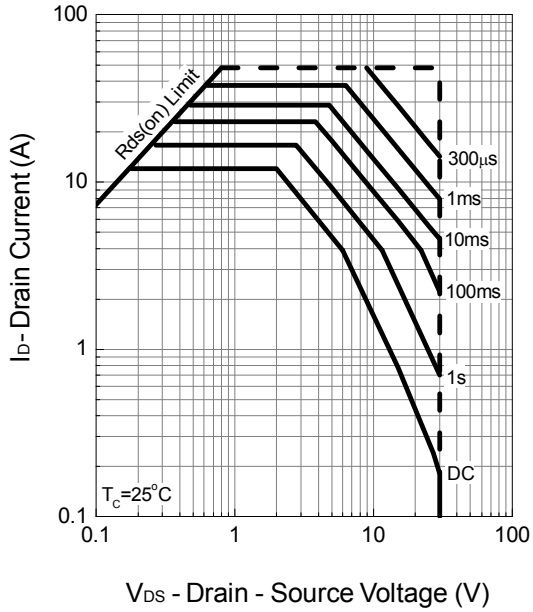
Power Dissipation



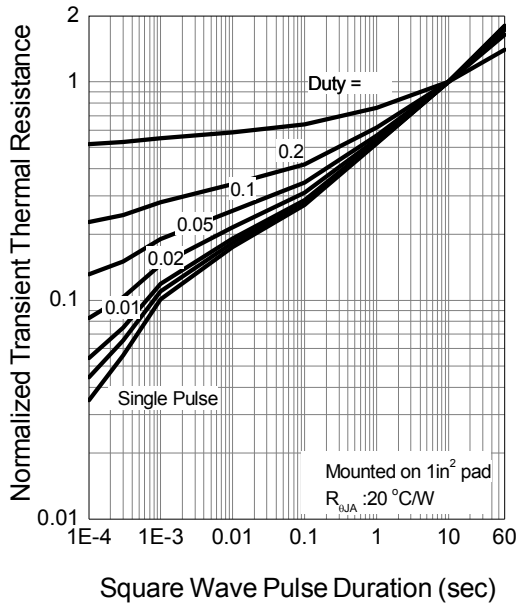
Drain Current



Safe Operation Area

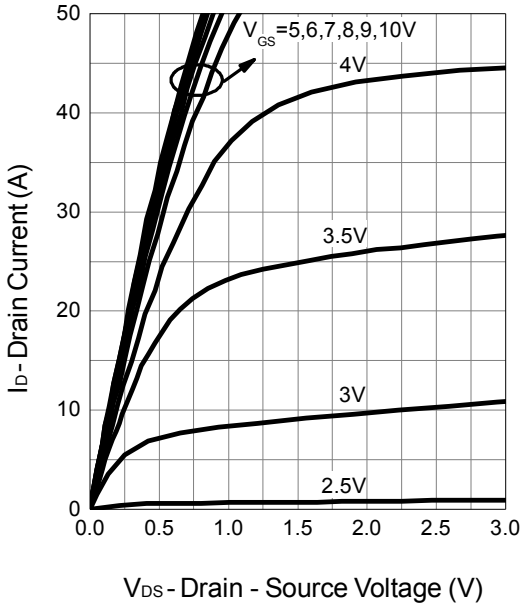


Thermal Transient Impedance

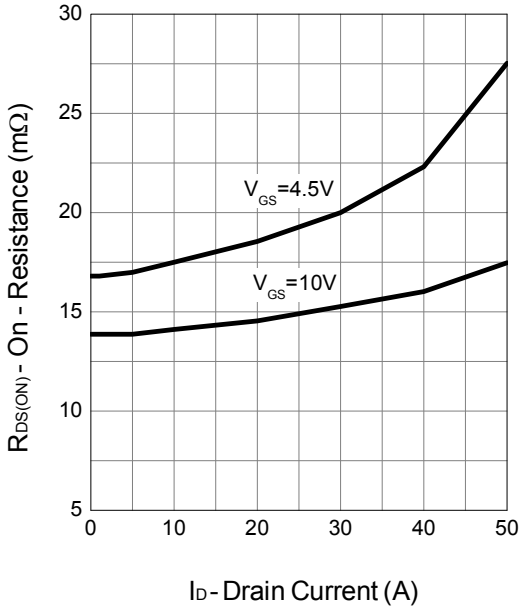


N-Channel Typical Characteristics

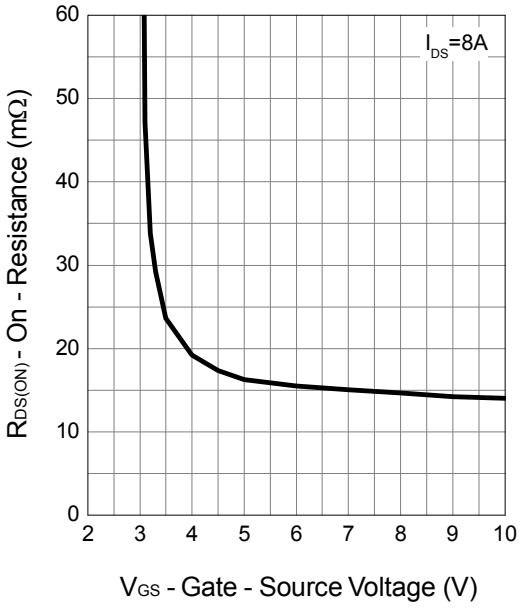
Output Characteristics



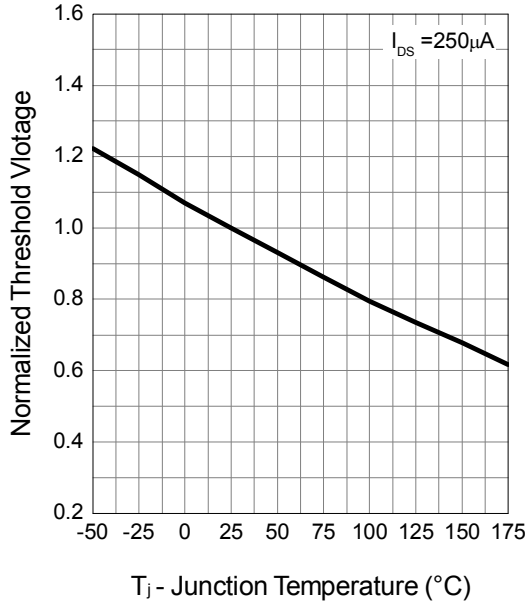
Drain-Source On Resistance



Gate-Source On Resistance

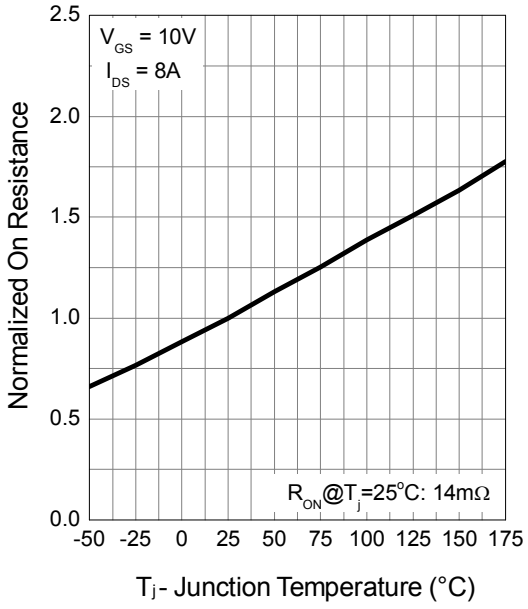


Gate Threshold Voltage

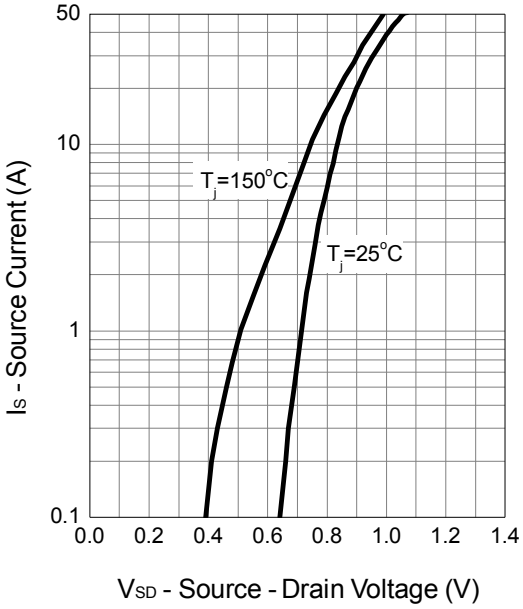


N-Channel Typical Characteristics

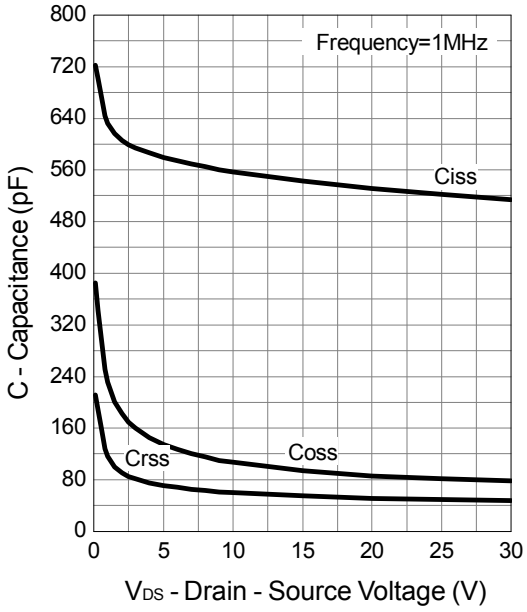
Drain-Source On Resistance



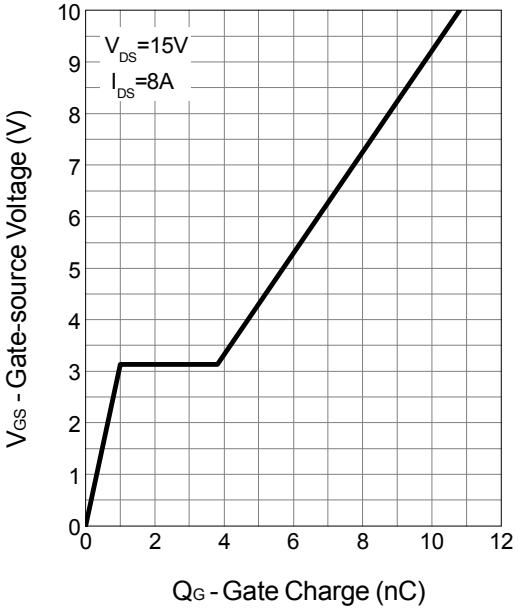
Source-Drain Diode Forward



Capacitance

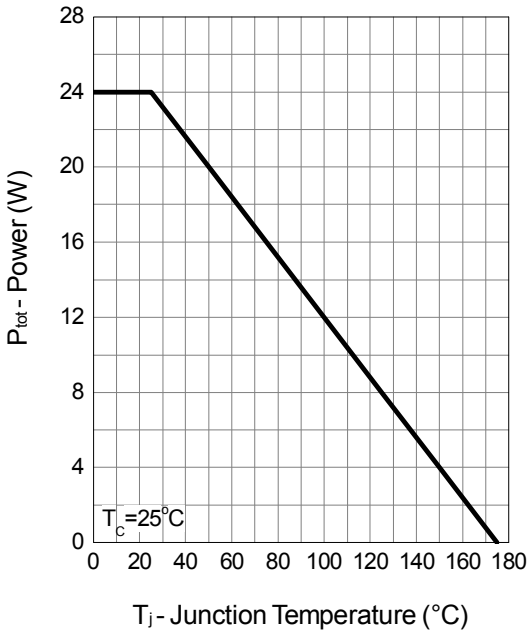


Gate Charge

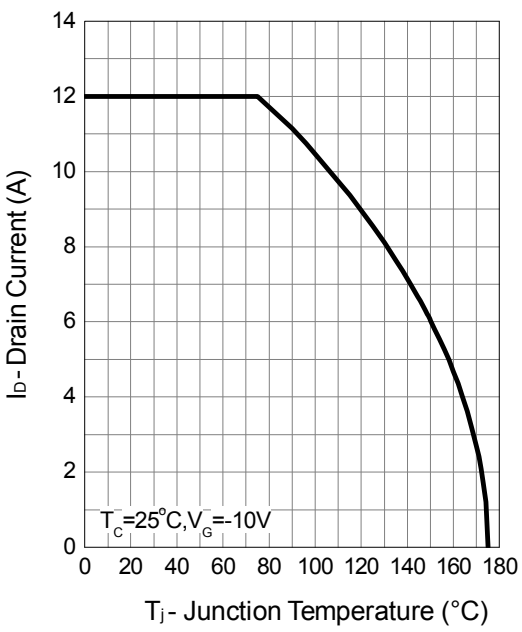


P-Channel Typical Characteristics

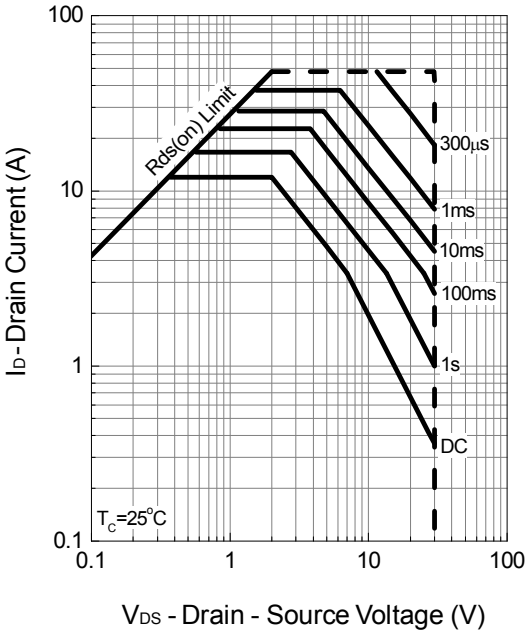
Power Dissipation



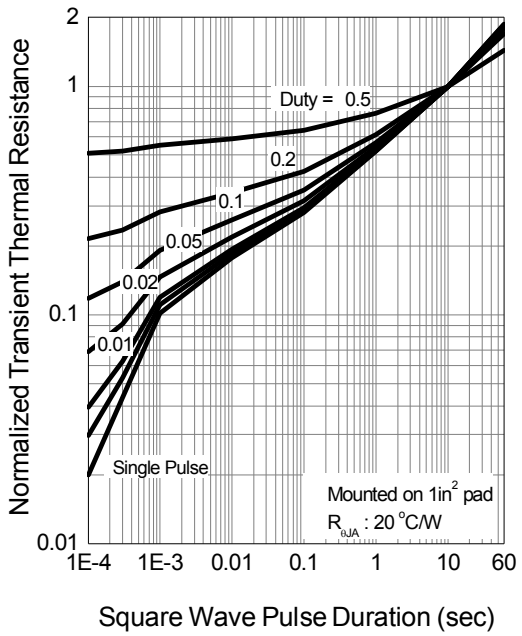
Drain Current



Safe Operation Area

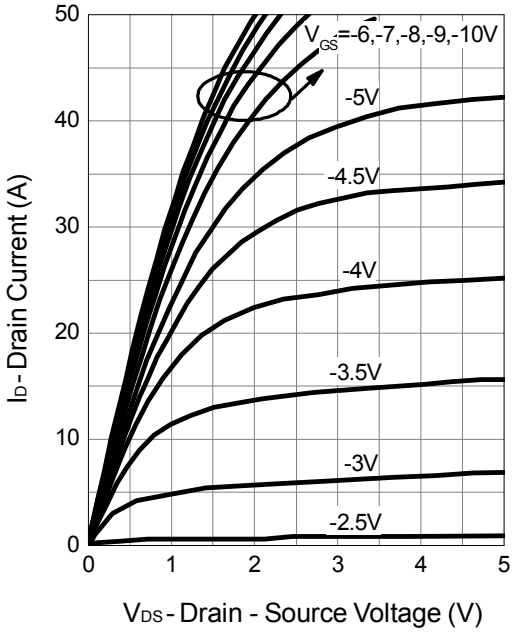


Thermal Transient Impedance

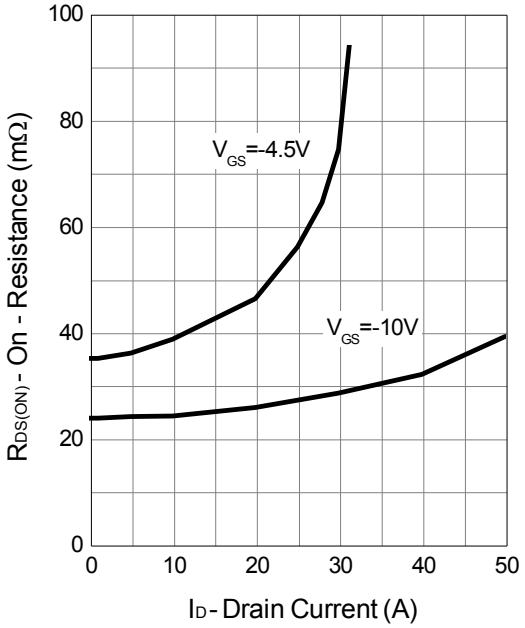


P-Channel Typical Characteristics

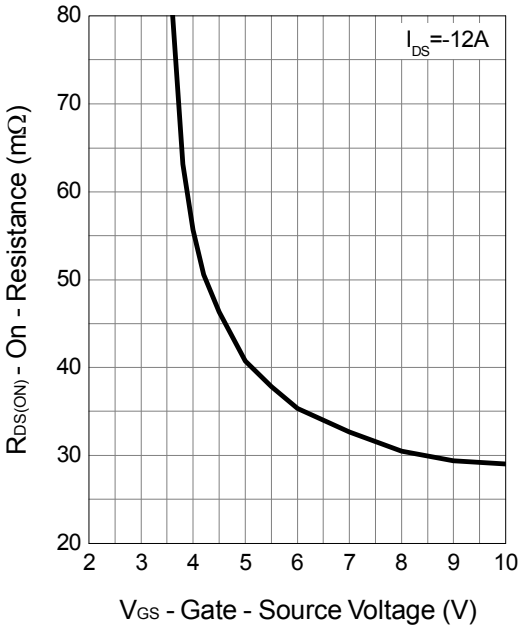
Output Characteristics



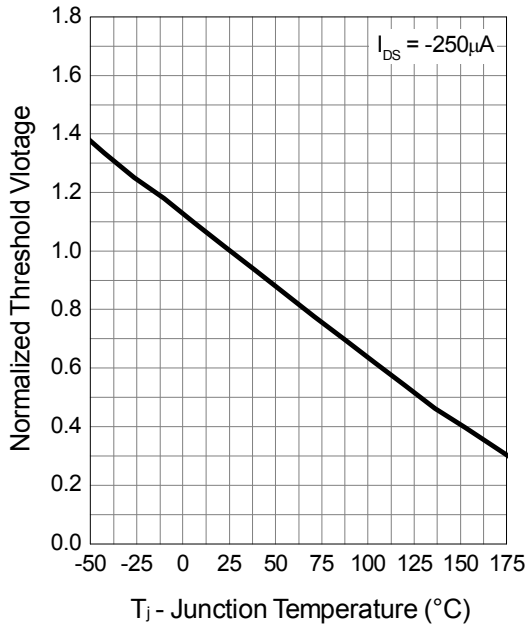
Drain-Source On Resistance



Gate-Source On Resistance

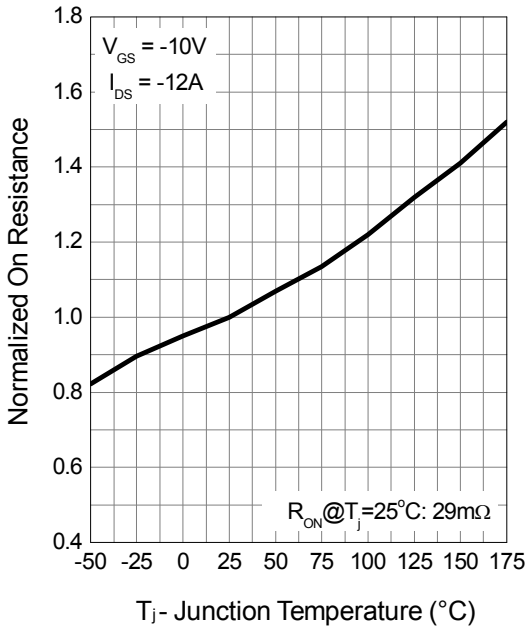


Gate Threshold Voltage

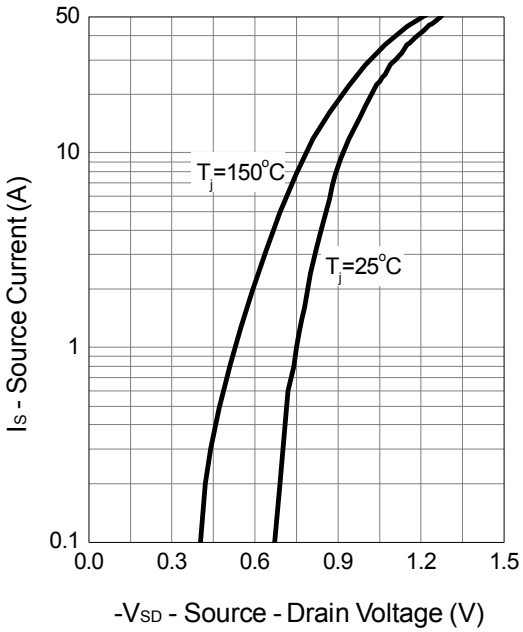


P-Channel Typical Characteristics

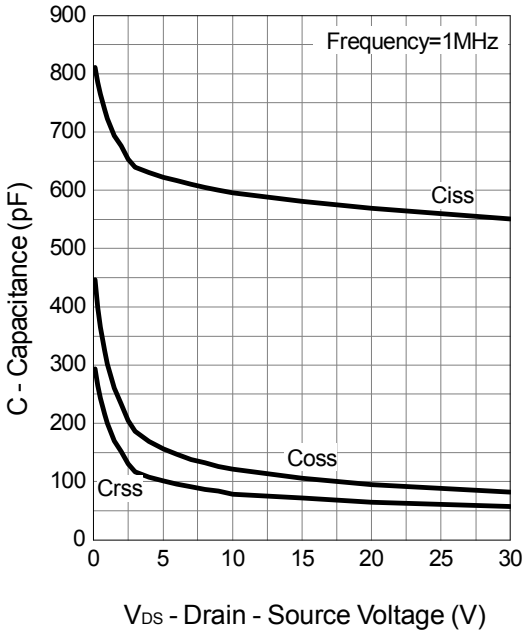
Drain-Source On Resistance



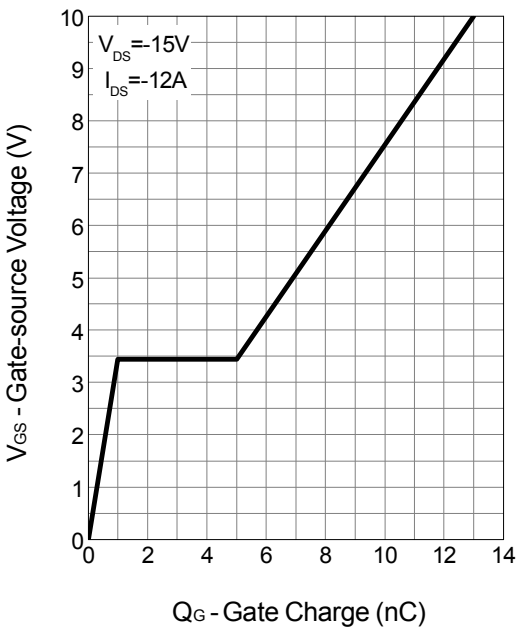
Source-Drain Diode Forward



Capacitance



Gate Charge



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