

General Description

The WSP85N10 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 synchronous buck converter applications.

The WSP85N10 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

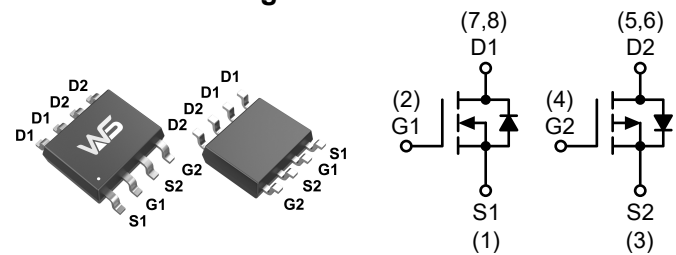
Product Summary

BV_{DSS}	$R_{DS(on)}$	I_D
100V	100m Ω	4.5A
-100V	150m Ω	-2.5A

Applications

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

SOP-8L 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, $V_{GS(NP)}=10V, T_c=25^\circ C$	4.5*	-2.5*	A
	Continuous Drain Current, $V_{GS(NP)}=10V, T_c=100^\circ C$	2.5	-1.4	A
I_{DP}^a	Pulse Drain Current Tested, $V_{GS(NP)}=10V$	10	-7	A
E_{AS}^c	Avalanche Energy, Single pulse, L=0.5mH	6.25	12	mJ
I_{AS}^c	Avalanche Current, Single pulse, L=0.5mH	3	-5	A
P_D	Total Power Dissipation, $T_a=25^\circ C$	2.1	2.1	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	$^\circ C$
T_J	Operating Junction Temperature Range	150	150	$^\circ C$
$R_{\theta JA}$	Junction to Ambient, $T < 10s$	60	60	$^\circ C/W$
$R_{\theta JA}$	Junction to Ambient, Steady State ^b	95	95	$^\circ C/W$

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 1in², FR-4 board with 2oz. Copper.

Note c : UIS tested and pulse width limited by maximum junction temperature 150 $^\circ C$ (initial temperature $T_J=25^\circ C$).

Electrical Characteristics ($T_J=25\text{ }^{\circ}\text{C}$, 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	$V_{GS}=10V$, $I_D=2.5A$	---	100	110	$m\Omega$
		$V_{GS}=4.5V$, $I_D=2A$	---	110	150	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}$, $I_D=250\mu A$	1.2	2.0	2.5	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
R_g	Gate Resistance	$V_{DS}=0V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	2.5	3.6	Ω
Q_g^e	Total Gate Charge	$V_{DS}=50V$, $V_{GS}=10V$, $I_{DS}=2.5A$	---	10	---	nC
Q_{gs}^e	Gate-Source Charge		---	2.4	---	
Q_{gd}^e	Gate-Drain Charge		---	3.0	---	
$T_{d(on)}^e$	Turn-On Delay Time	$V_{DD}=30V$, $R_L=30R$, $I_{DS}=1A$, $V_{GEN}=10V$, $R_G=6R$.	---	7	---	ns
T_r^e	Rise Time		---	9	---	
$T_{d(off)}^e$	Turn-Off Delay Time		---	5	---	
T_f^e	Fall Time		---	19	---	
C_{iss}^e	Input Capacitance	$V_{DS}=30V$, $V_{GS}=0V$, $f=1\text{MHz}$	---	445	---	pF
C_{oss}^e	Output Capacitance		---	32	---	
C_{rss}^e	Reverse Transfer Capacitance		---	16	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current	$V_G=V_D=0V$, Force Current	---	---	2.5	A
V_{SD}^d	Diode Forward Voltage	$V_{GS}=0V$, $I_S=2.5A$, $T_J=25^{\circ}\text{C}$	---	---	1.3	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.

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	-100	---	---	V
R _{DS(ON)} ^d	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-1.7A	---	150	180	mΩ
		V _{GS} =-4.5V, I _D =-1A	---	170	210	
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°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
Q _g ^e	Total Gate Charge	V _{DS} =-50V, V _{GS} =-4.5V, I _D =-1.7A	---	11	---	nC
Q _{gs} ^e	Gate-Source Charge		---	2.0	---	
Q _{gd} ^e	Gate-Drain Charge		---	3.0	---	
T _{d(on)} ^e	Turn-On Delay Time	V _{DD} =-30V, V _{GS} =-10V, R _G =6Ω, I _D =-1A, R _L =15Ω,	---	5	---	ns
T _r ^e	Rise Time		---	7	---	
T _{d(off)} ^e	Turn-Off Delay Time		---	22	---	
T _f ^e	Fall Time		---	25	---	
C _{iss} ^e	Input Capacitance	V _{DS} =-30V, V _{GS} =0V, f=1MHz	---	450	---	pF
C _{oss} ^e	Output Capacitance		---	32	---	
C _{rss} ^e	Reverse Transfer Capacitance		---	18	---	

Diode Characteristics

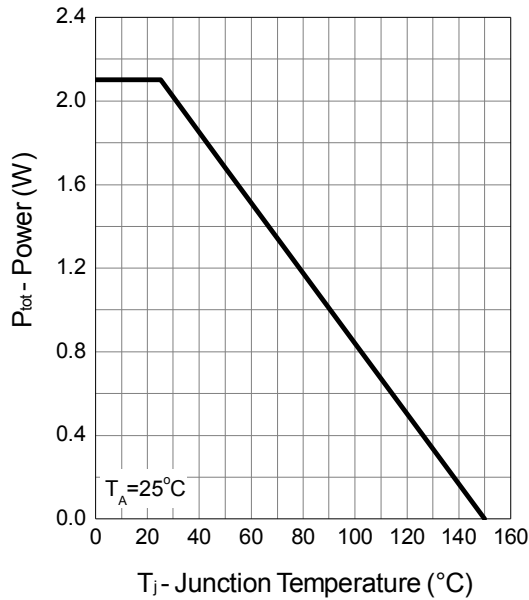
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current	V _G =V _D =0V, Force Current	---	---	-1.7	A
V _{SD} ^e	Diode Forward Voltage	V _{GS} =0V, I _S =-1.7A, T _J =25°C	---	---	-1.2	V

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

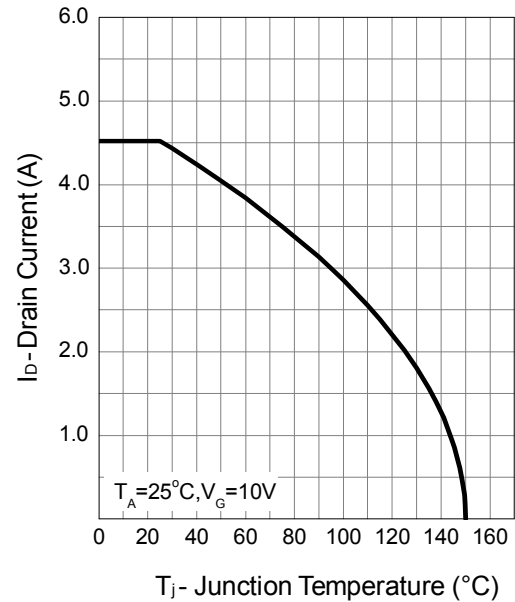
Note e : Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

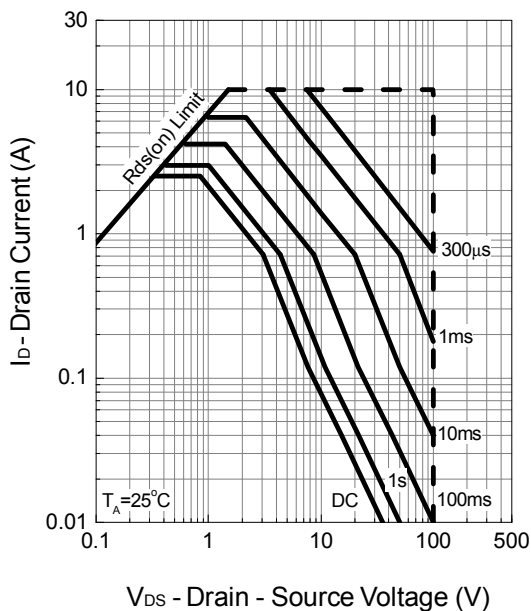
Power Dissipation



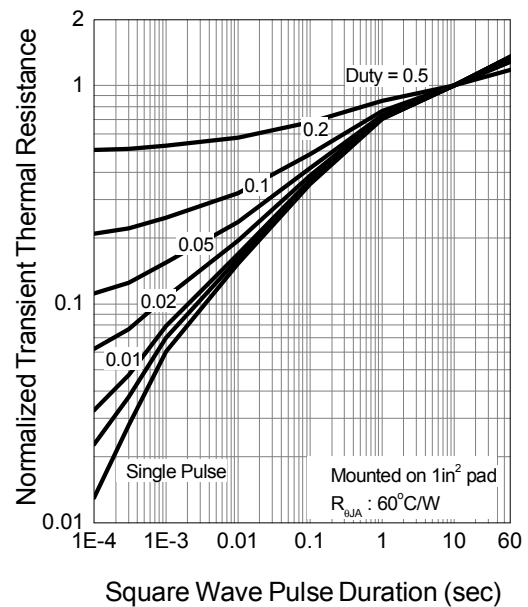
Drain Current



Safe Operation Area

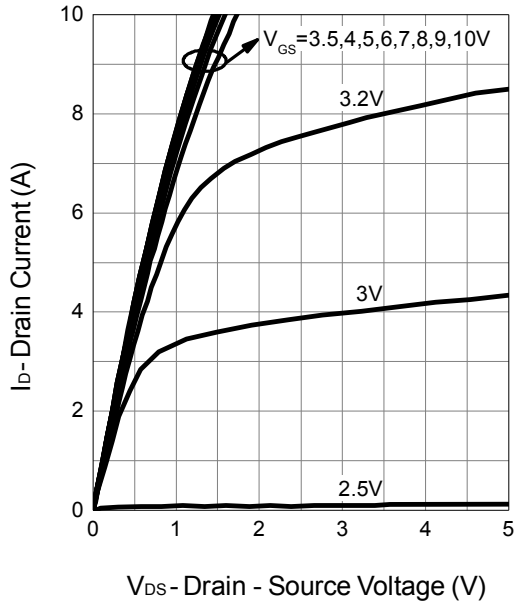


Thermal Transient Impedance

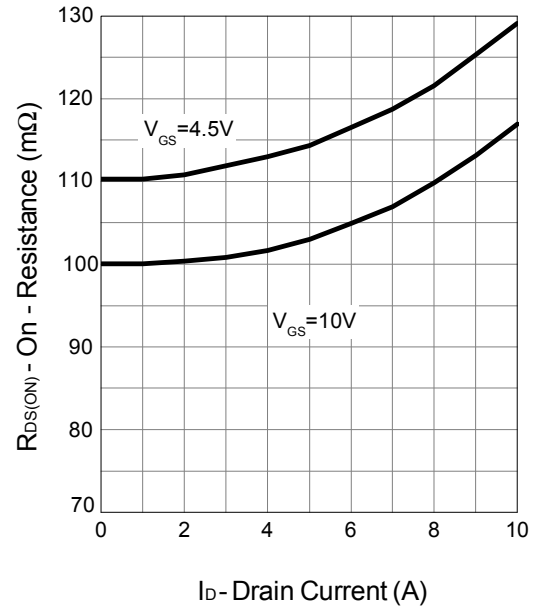


N-Channel Typical Characteristics

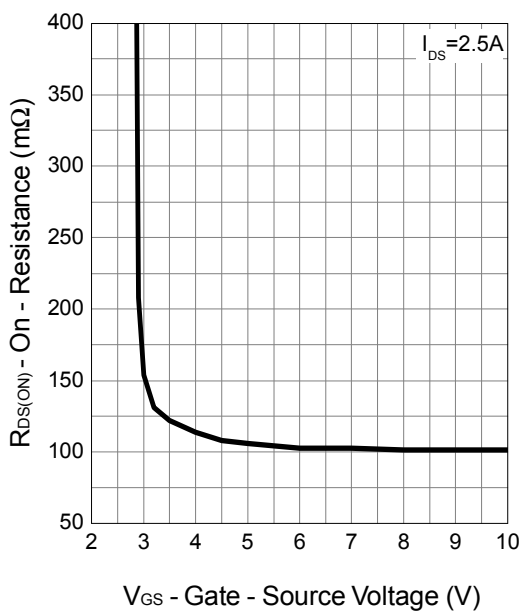
Output Characteristics



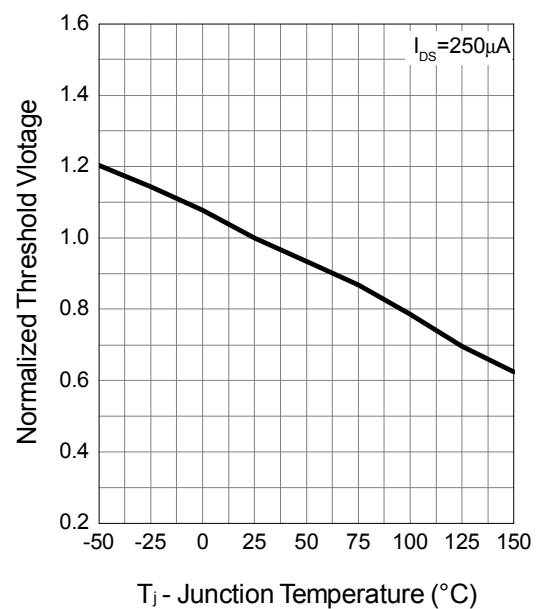
Drain-Source On Resistance



Gate-Source On Resistance

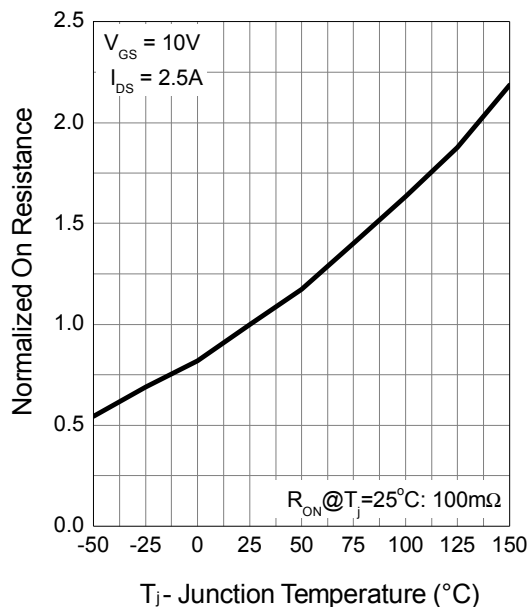


Gate Threshold Voltage

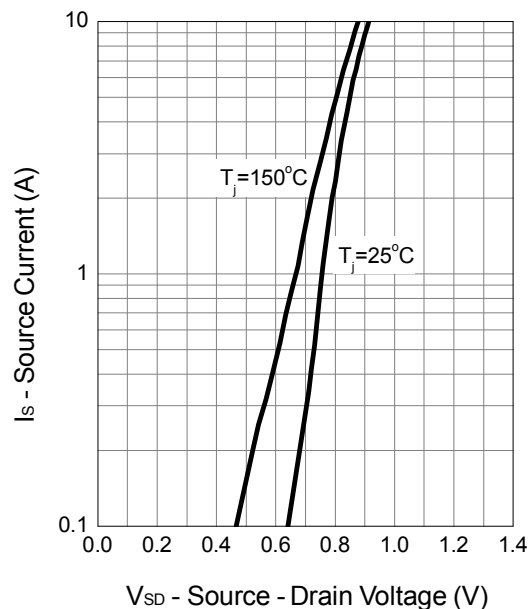


N-Channel Typical Characteristics

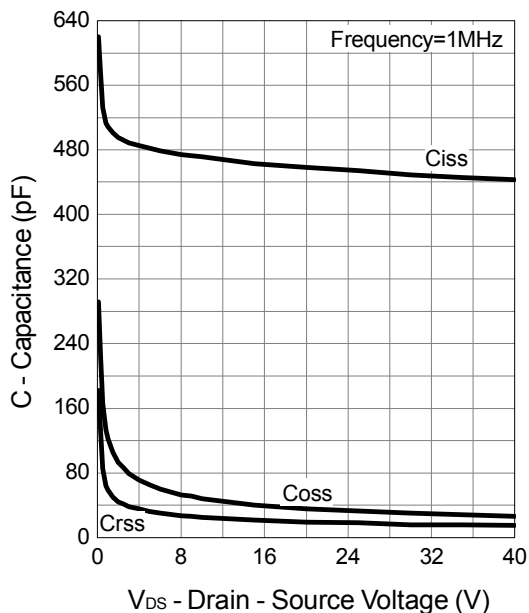
Drain-Source On Resistance



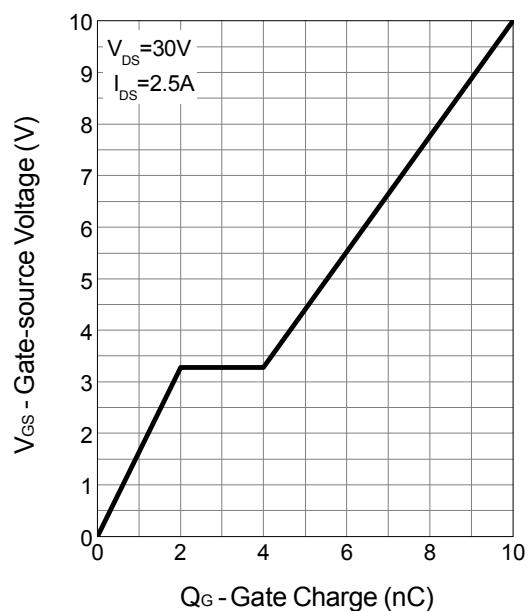
Source-Drain Diode Forward



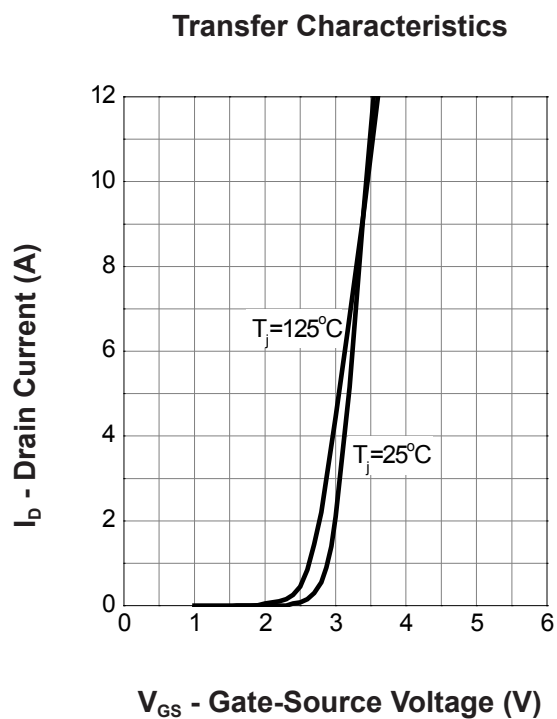
Capacitance



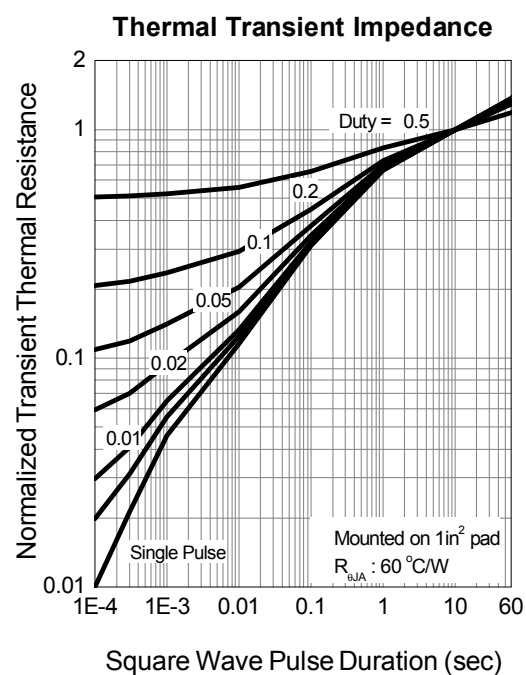
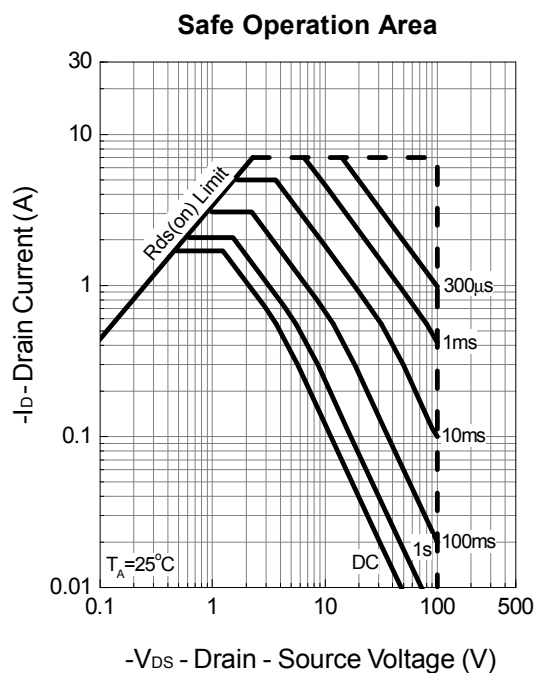
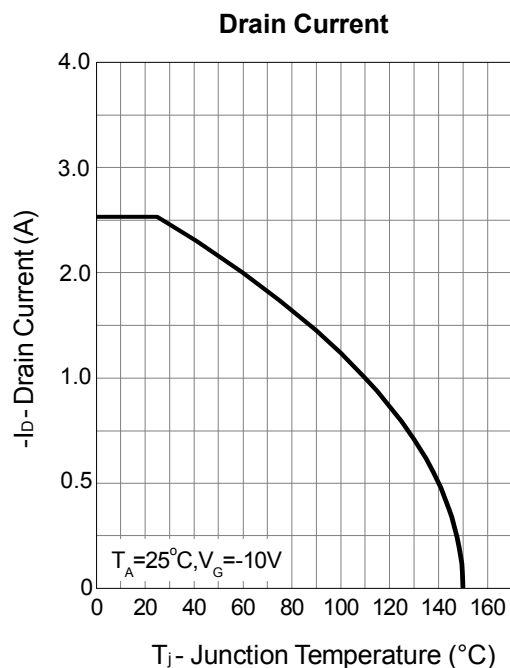
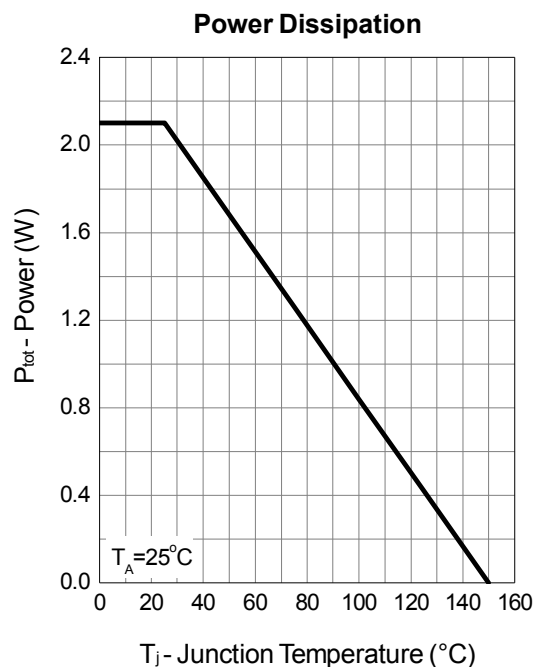
Gate Charge



N-Channel Typical Characteristics

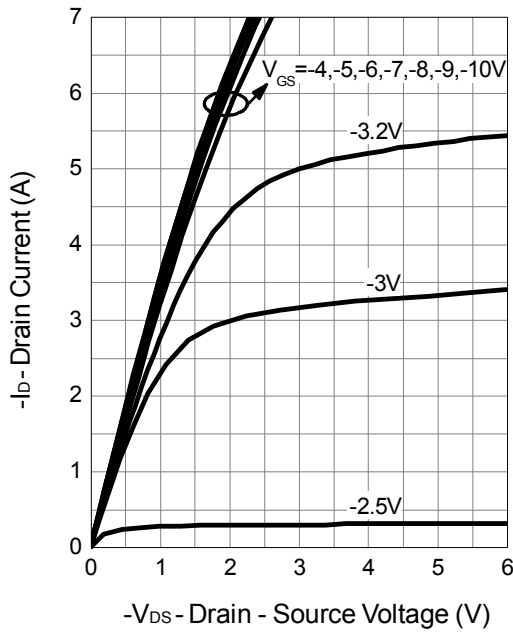


P-Channel Typical Characteristics

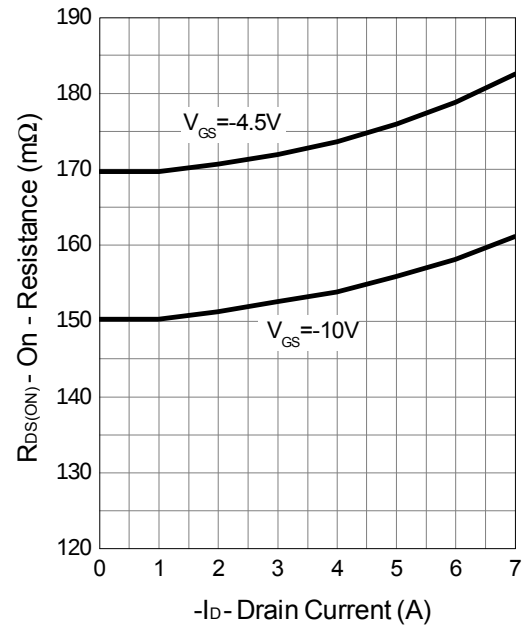


P-Channel Typical Characteristics

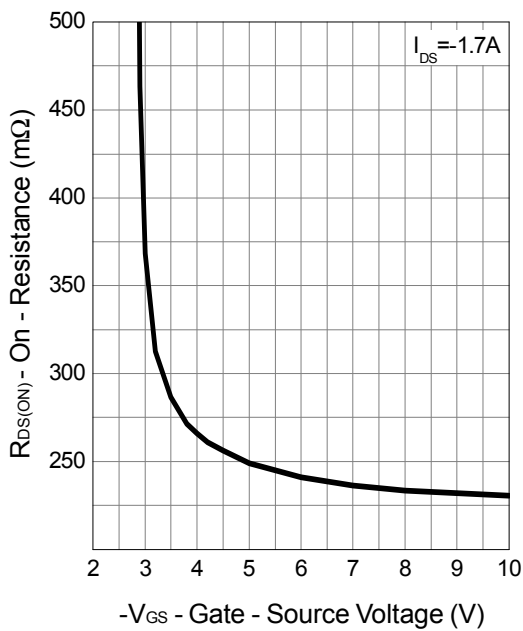
Output Characteristics



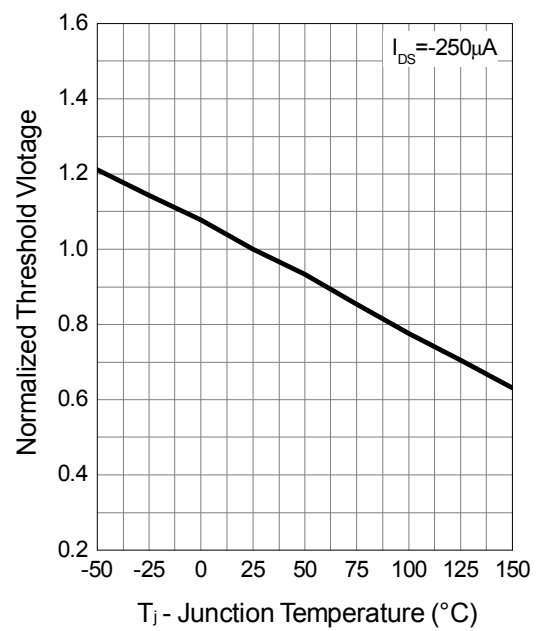
Drain-Source On Resistance



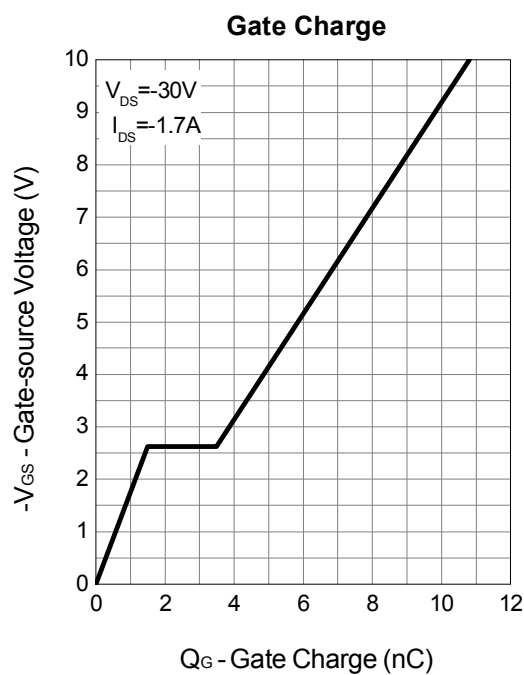
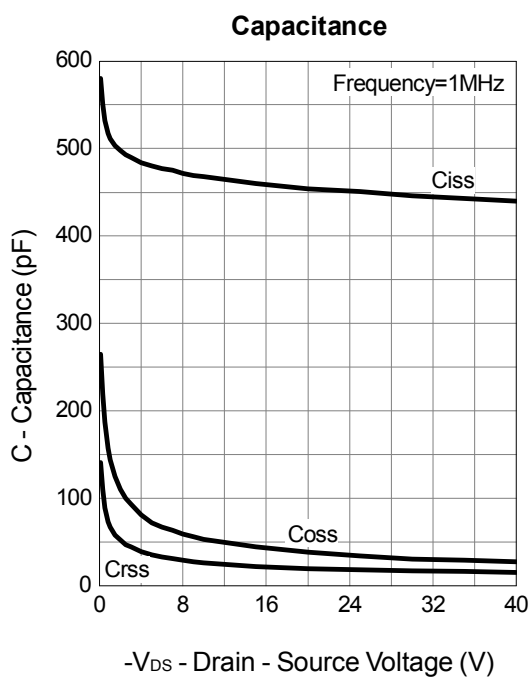
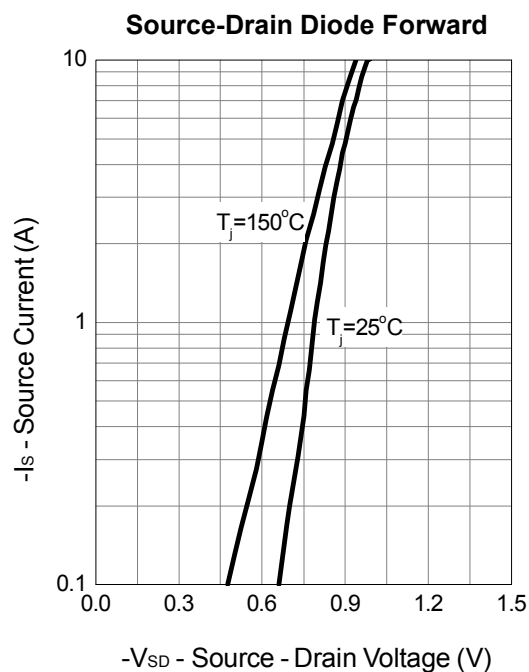
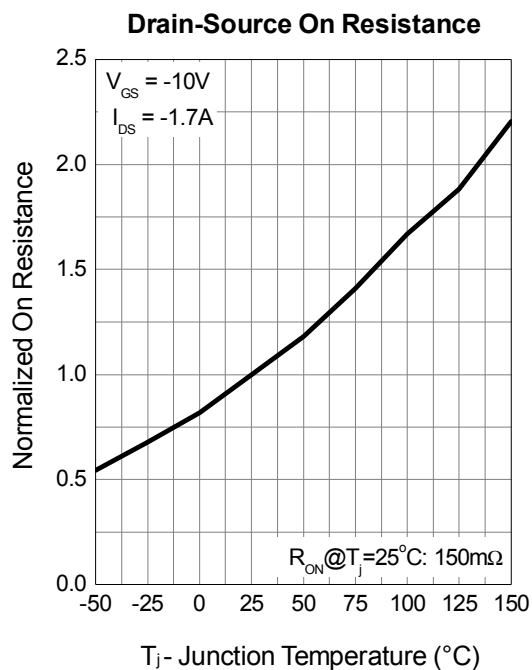
Gate-Source On Resistance



Gate Threshold Voltage

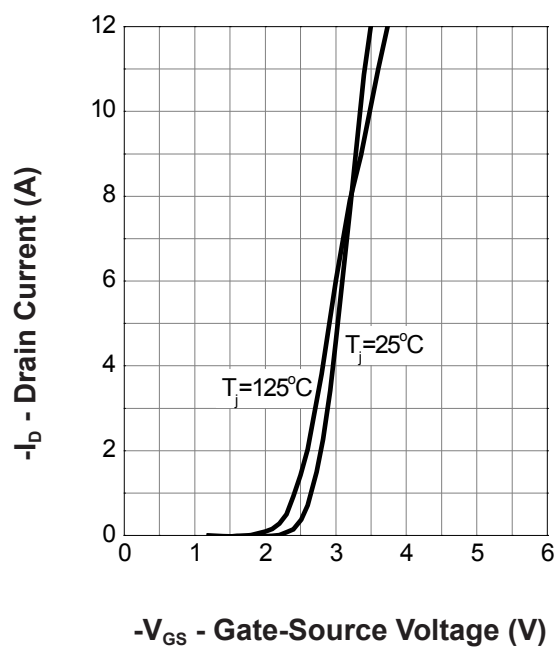


P-Channel Typical Characteristics

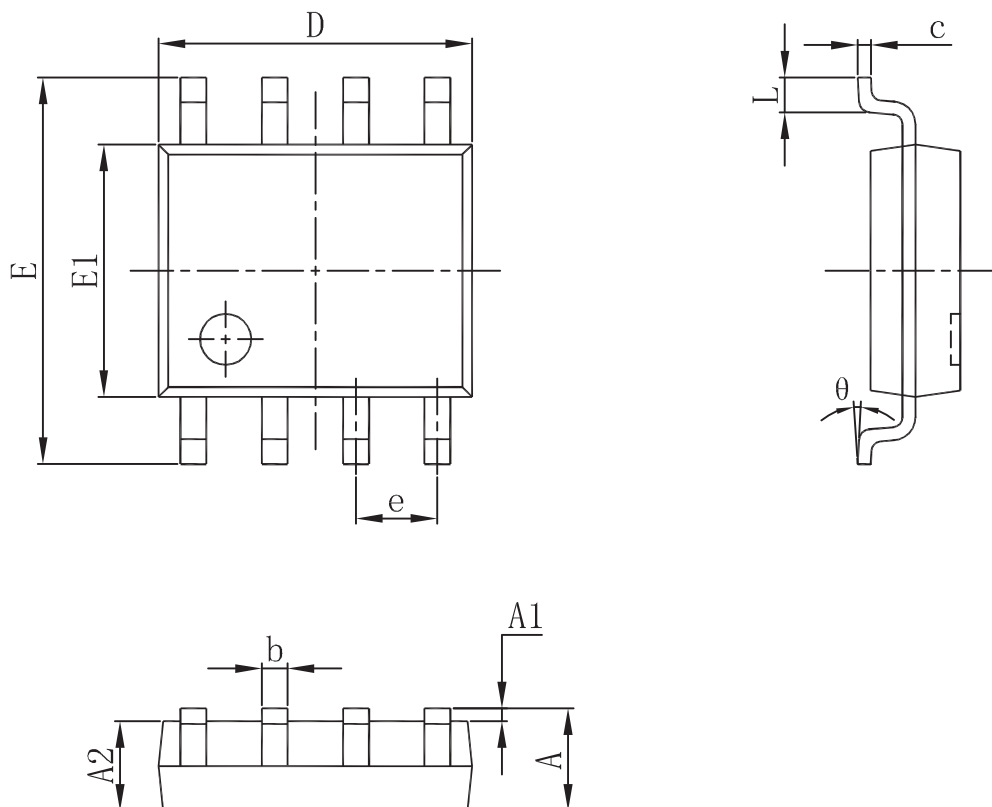


P-Channel Typical Characteristics

Transfer Characteristics



Packaging information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

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