

General Description

The WSD19N10DN56 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 synchronous buck converter applications.

The WSD19N10DN56 meet the RoHS and Green Product requirement 100% E_{AS} guaranteed with full function reliability approved.

Features

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

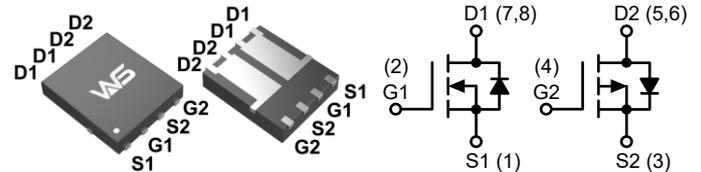
Product Summary

BV_{DSS}	$R_{DS(ON)}$	I_D
100V	100mΩ	15A
-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

DFN5X6-8L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	100	-100	V
V_{GS}	Gate-Source Voltage	±20	±20	
I_D	Continuous Drain Current, $V_{GS(NP)}=10V$, $T_C=25^\circ C$	15	-12	A
	Continuous Drain Current, $V_{GS(NP)}=10V$, $T_C=100^\circ C$	6.0	-4.8	
I_{DP}^1	Pulse Drain Current Tested, $V_{GS(NP)}=10V$	45	-36	
E_{AS}^3	Avalanche Energy, Single pulse, L=0.5mH	6.25	20	mJ
I_{AS}^3	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	
$R_{\theta JA}^2$	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	

N-Channel Electrical Characteristics (T_J=25°C, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	100	---	---	V
R _{DS(ON)} ⁴	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 =250μA	1.3	1.8	2.5	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =20V, V _{GS} =0V, T _J =25°C	---	---	1.0	μA
		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 = 1.0MHz	---	2.5	3.6	Ω
Q _g ⁵	Total Gate Charge	V _{DS} =50V, V _{GS} =10V, I _D =4A	---	10	---	nC
Q _{gs} ⁵	Gate-Source Charge		---	2.5	---	
Q _{gd} ⁵	Gate-Drain Charge		---	3.3	---	
T _{d(on)} ⁵	Turn-On Delay Time	V _{DD} =30V, R _L =30Ω, I _{DS} =1A, V _{GEN} =10V, R _G =6Ω	---	9	---	ns
T _r ⁵	Rise Time		---	7	---	
T _{d(off)} ⁵	Turn-Off Delay Time		---	19	---	
T _f ⁵	Fall Time		---	5	---	
C _{iss} ⁵	Input Capacitance	V _{DS} =30V, V _{GS} =0V, f = 1.0MHz	---	450	---	pF
C _{oss} ⁵	Output Capacitance		---	31	---	
C _{rss} ⁵	Reverse Transfer Capacitance		---	15	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I _S	Continuous Source Current	V _G =V _D =0V, Force Current	---	---	15	A
V _{SD} ⁴	Diode Forward Voltage	V _{GS} =0V, I _S =5A, T _J =25°C	---	---	1.3	V

Note:

*. Max. current is limited by bonding wire.

1. Pulse width limited by max. junction temperature.

2. R_{θJA} steady state t=999s. R_{θJA} is measured with the device mounted on 1in², FR-4 board with 2oz. Copper.

3. UIS tested and pulse width limited by maximum junction temperature 175°C(initial temperature T_J=25°C).

4. Pulse test ; pulse width ≤ 300μs, duty cycle ≤ 2%.

5. 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.	Units
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =-250μA	-100	---	---	V
R _{DS(ON)} ⁴	Static Drain-Source On-Resistance	V _{GS} =-10V, I _D =-3A	---	150	180	mΩ
		V _{GS} =-4.5V, I _D =-2A	---	170	210	
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =-250μA	-1.3	-1.8	-2.3	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =-20V, V _{GS} =0V, T _J =25°C	---	---	-1.0	μA
		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 ⁵	Total Gate Charge	V _{DS} =-50V, V _{GS} =-4.5V, I _D =-3A	---	16	---	nC
Q _{gs} ⁵	Gate-Source Charge		---	2.5	---	
Q _{gd} ⁵	Gate-Drain Charge		---	3.5	---	
T _{d(on)} ⁵	Turn-On Delay Time	V _{DD} =-30V, V _{GS} =-10V, R _G =6Ω, I _D =-1A, R _L =15Ω	---	9	---	ns
T _r ⁵	Rise Time		---	5	---	
T _{d(off)} ⁵	Turn-Off Delay Time		---	50	---	
T _f ⁵	Fall Time		---	30	---	
C _{iss} ⁵	Input Capacitance	V _{DS} =-30V, V _{GS} =0V, f = 1.0MHz	---	700	---	pF
C _{oss} ⁵	Output Capacitance		---	50	---	
C _{rss} ⁵	Reverse Transfer Capacitance		---	28	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
I _S	Continuous Source Current	V _G =V _D =0V, Force Current	---	---	-12	A
V _{SD} ⁵	Diode Forward Voltage	V _{GS} =0V, I _S =-3A, T _J =25°C	---	---	-1.2	V

Note:

*. Max. current is limited by bonding wire.

1. Pulse width limited by max. junction temperature.

2. R_{θJA} steady state t=999s. R_{θJA} is measured with the device mounted on 1in², FR-4 board with 2oz. Copper.

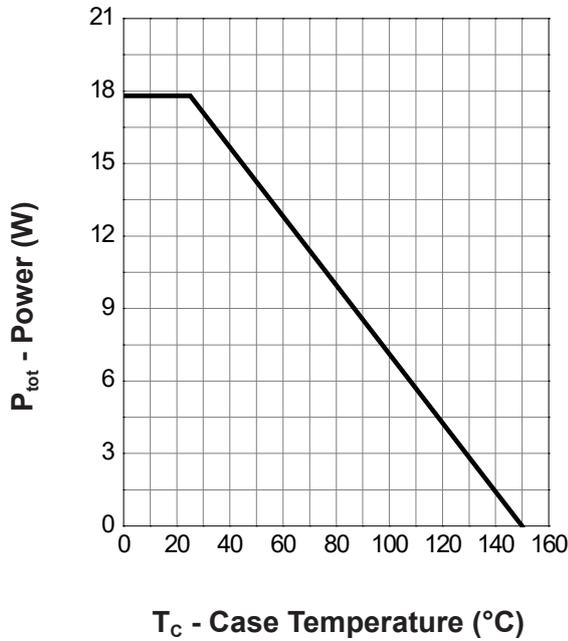
3. UIS tested and pulse width limited by maximum junction temperature 175°C(initial temperature T_J=25°C).

4. Pulse test ; pulse width ≤ 300μs, duty cycle ≤ 2%.

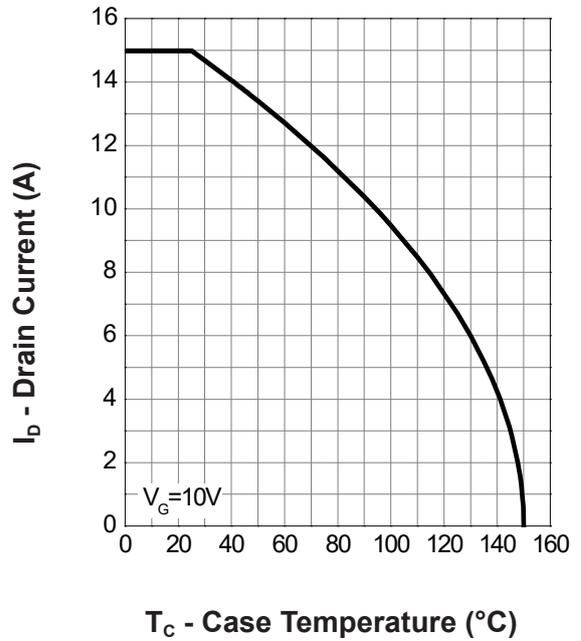
5. Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

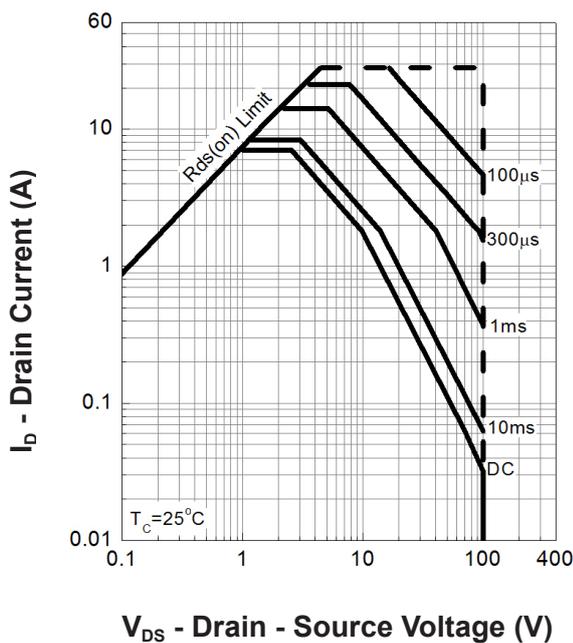
Power Dissipation



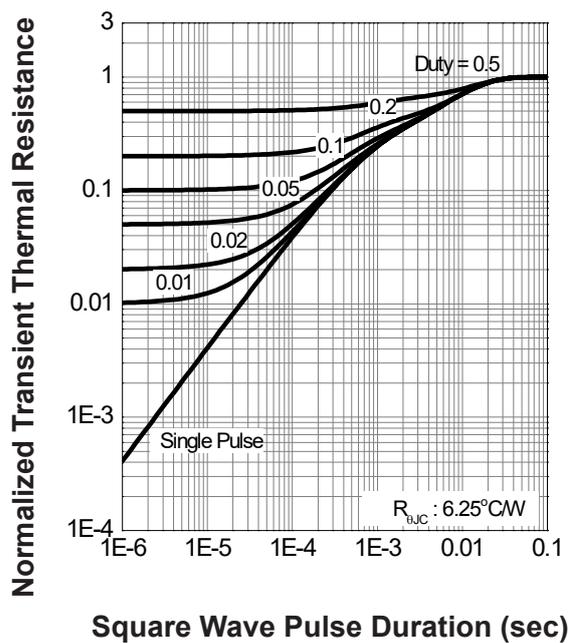
Drain Current



Safe Operation Area

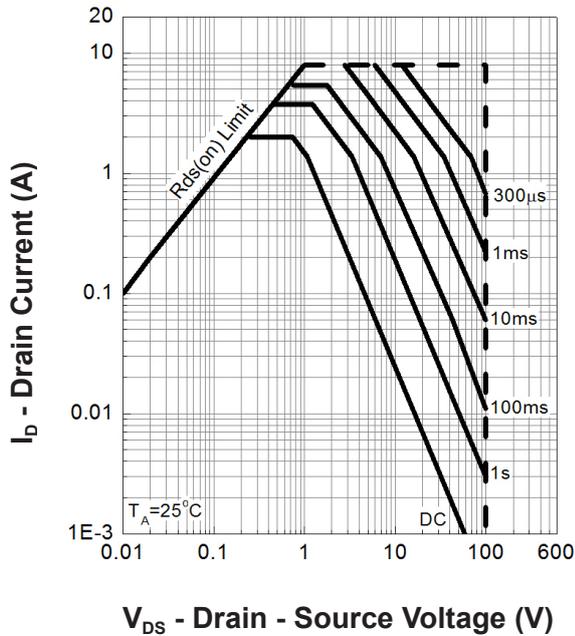


Thermal Transient Impedance

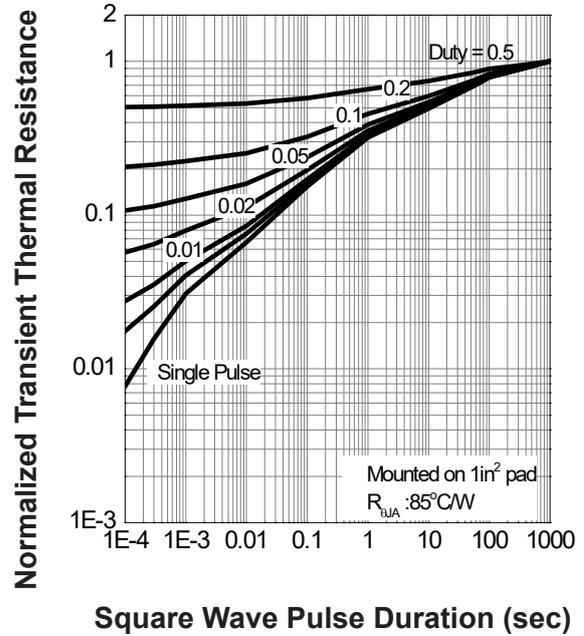


N-Channel Typical Characteristics (Cont.)

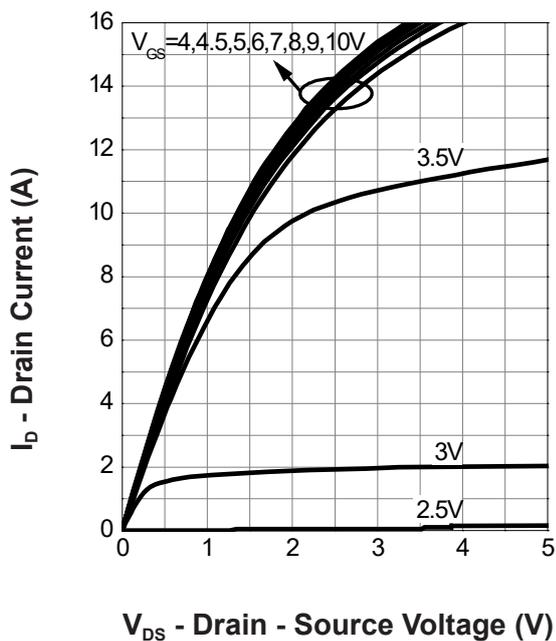
Safe Operation Area



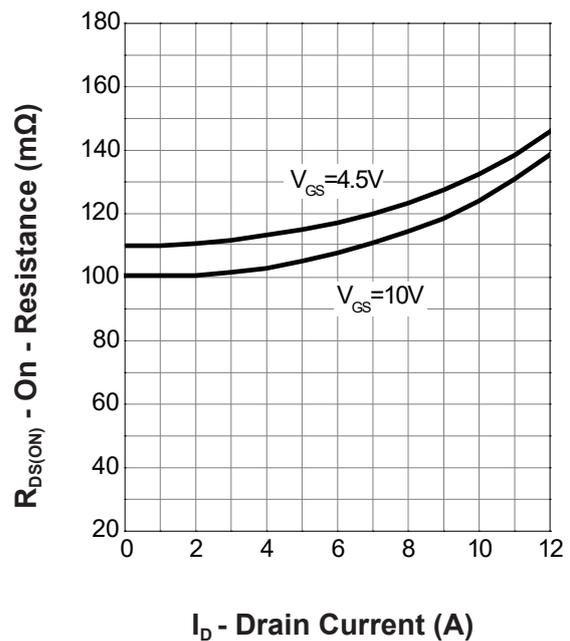
Thermal Transient Impedance



Output Characteristics

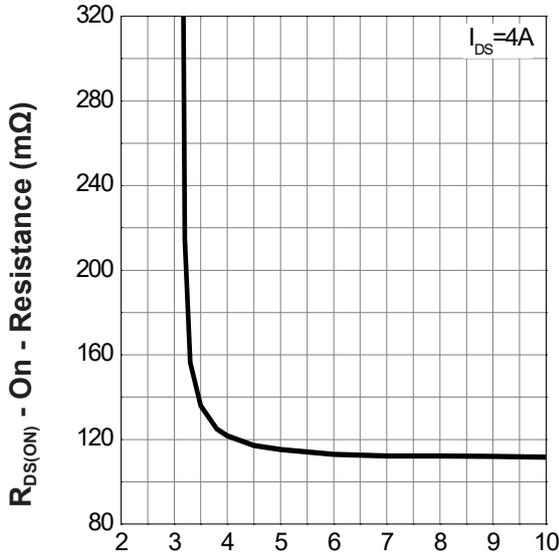


Drain-Source On Resistance



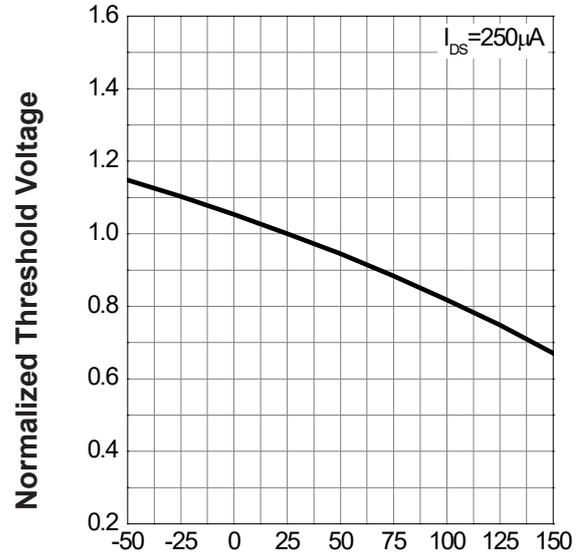
N-Channel Typical Characteristics (Cont.)

Gate-Source On Resistance



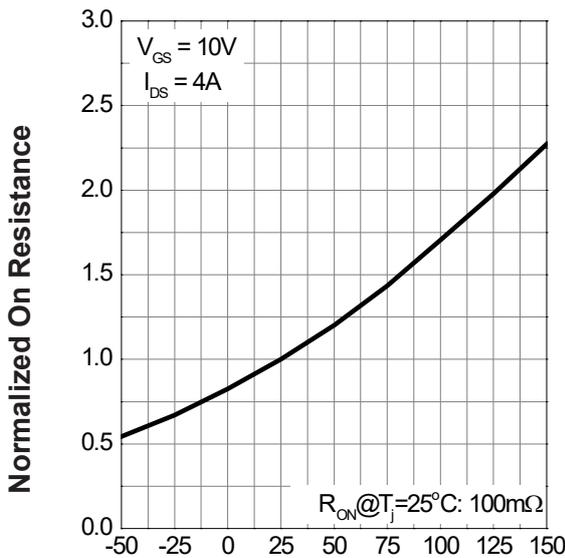
V_{GS} - Gate - Source Voltage (V)

Gate Threshold Voltage



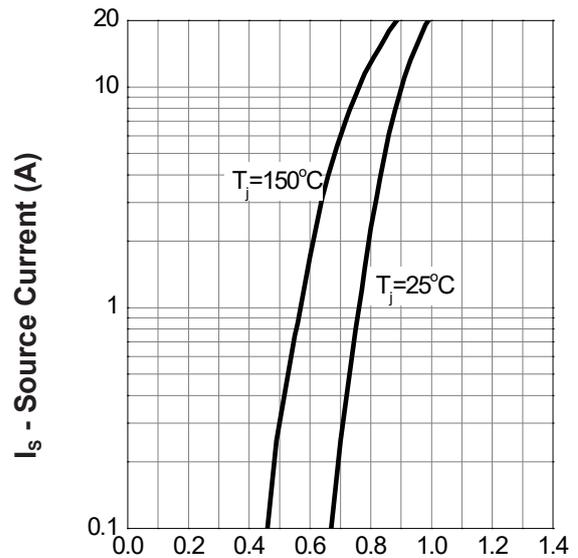
T_J - Junction Temperature (°C)

Drain-Source On Resistance



T_J - Junction Temperature (°C)

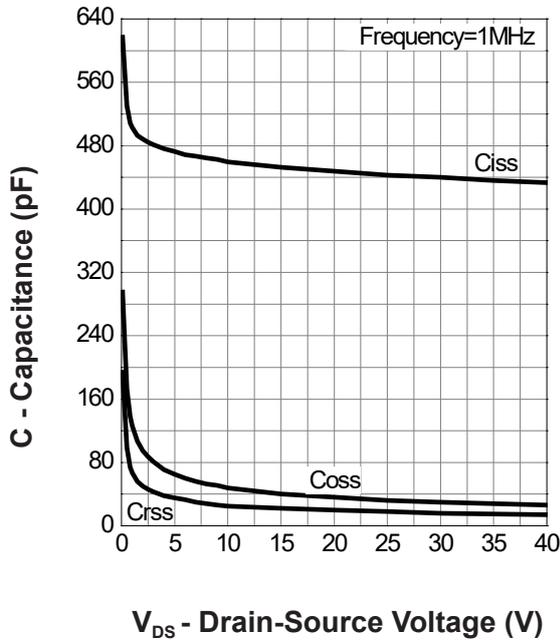
Source-Drain Diode Forward



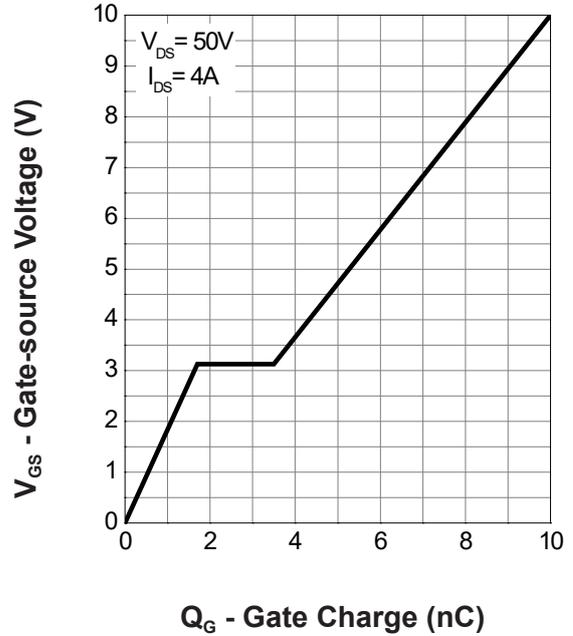
V_{SD} - Source - Drain Voltage (V)

N-Channel Typical Characteristics (Cont.)

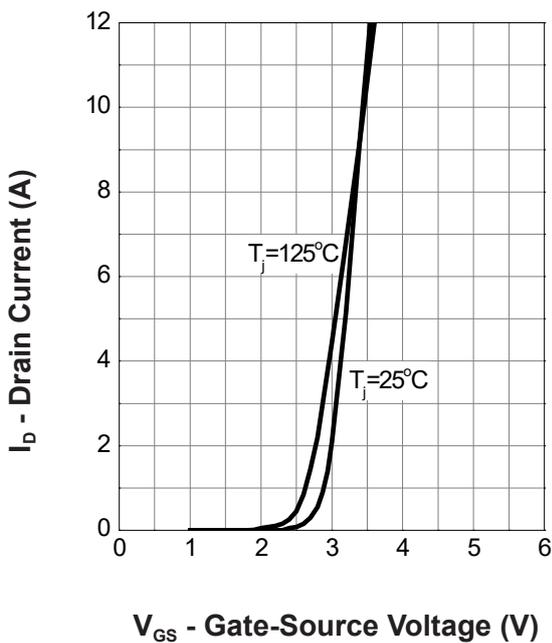
Capacitance



Gate Charge

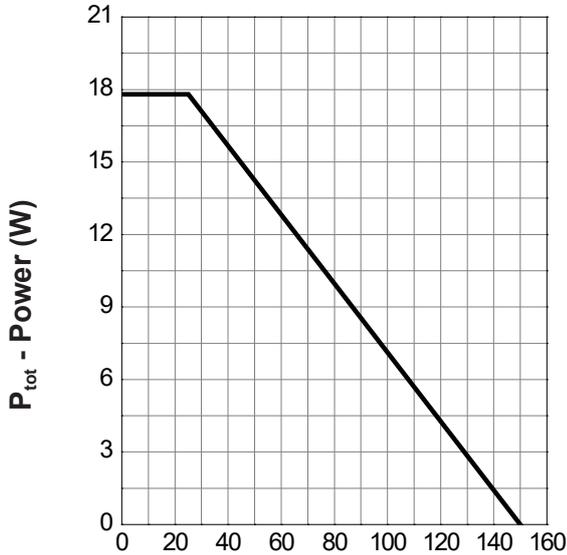


Transfer Characteristics



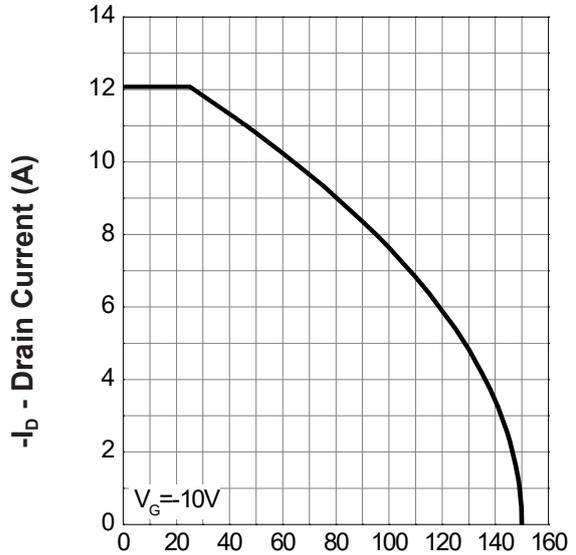
P-Channel Typical Characteristics

Power Dissipation



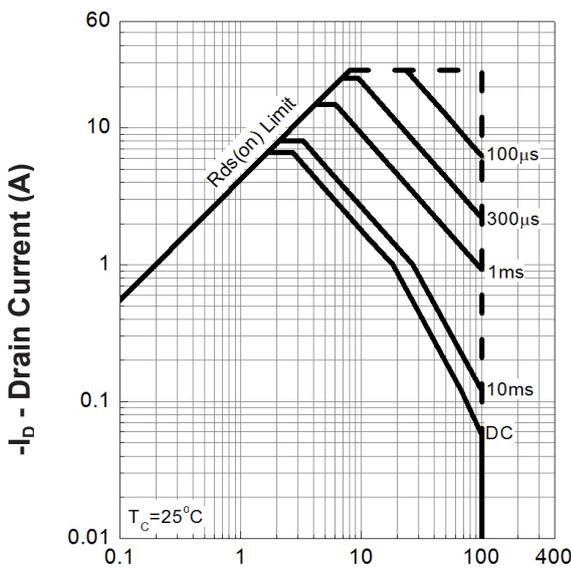
T_c - Case Temperature ($^{\circ}C$)

Drain Current



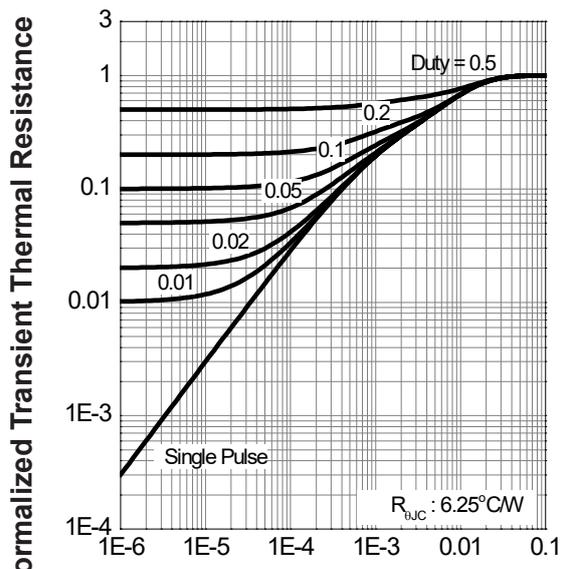
T_c - Case Temperature ($^{\circ}C$)

Safe Operation Area



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

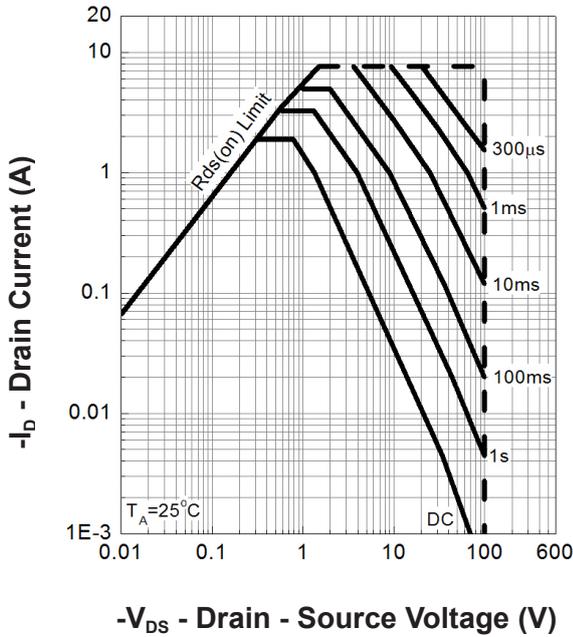
Thermal Transient Impedance



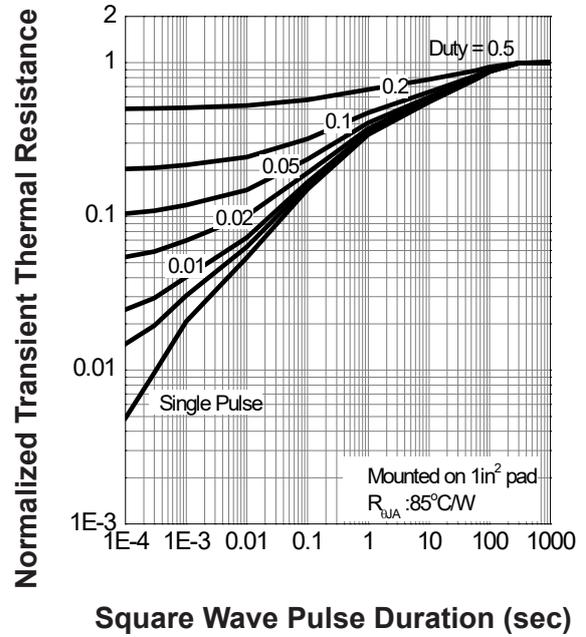
Square Wave Pulse Duration (sec)

P-Channel Typical Characteristics (Cont.)

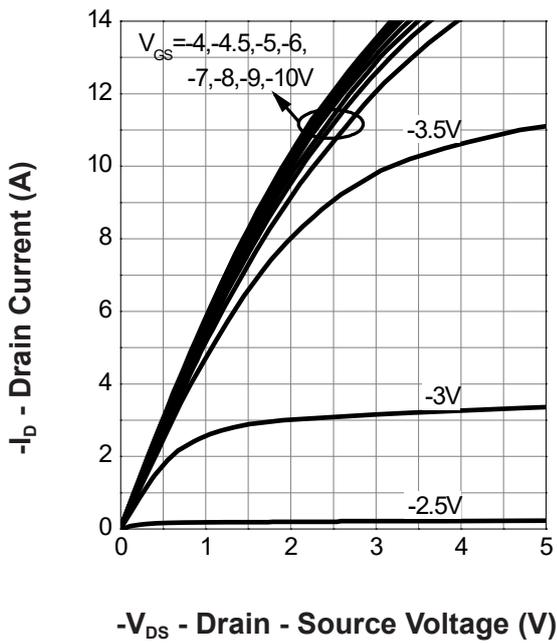
Safe Operation Area



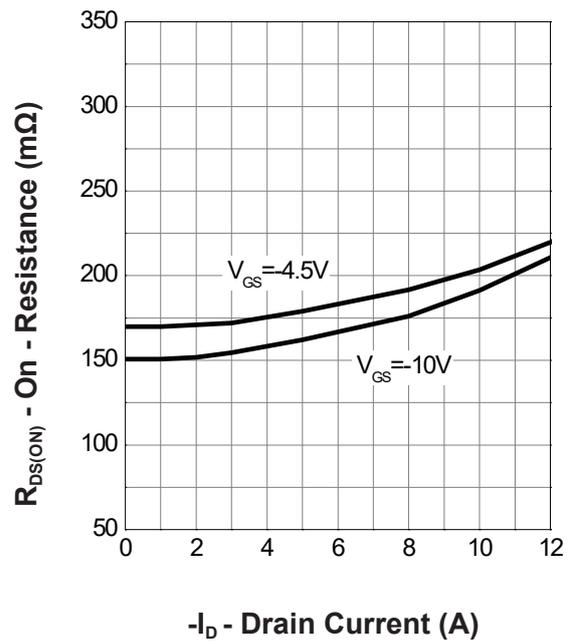
Thermal Transient Impedance



Output Characteristics

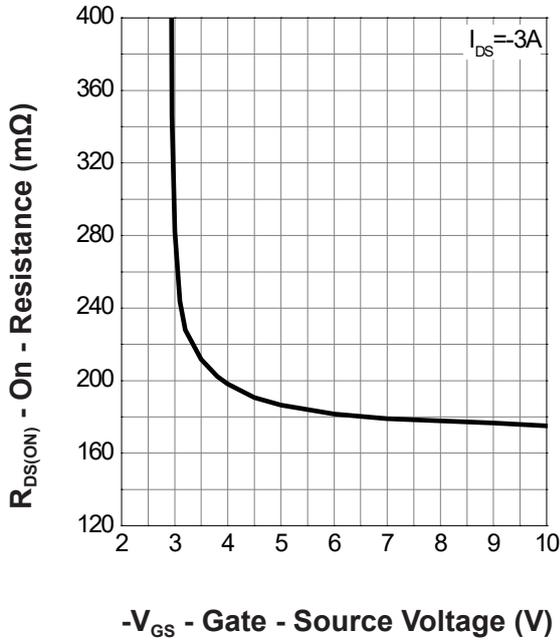


Drain-Source On Resistance

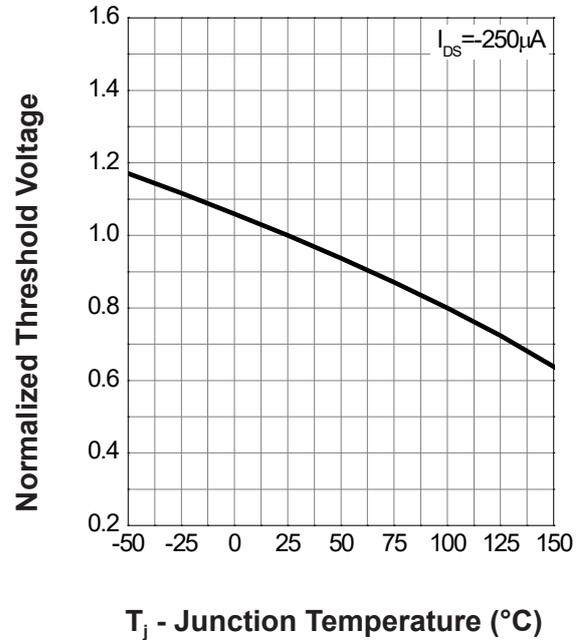


P-Channel Typical Characteristics (Cont.)

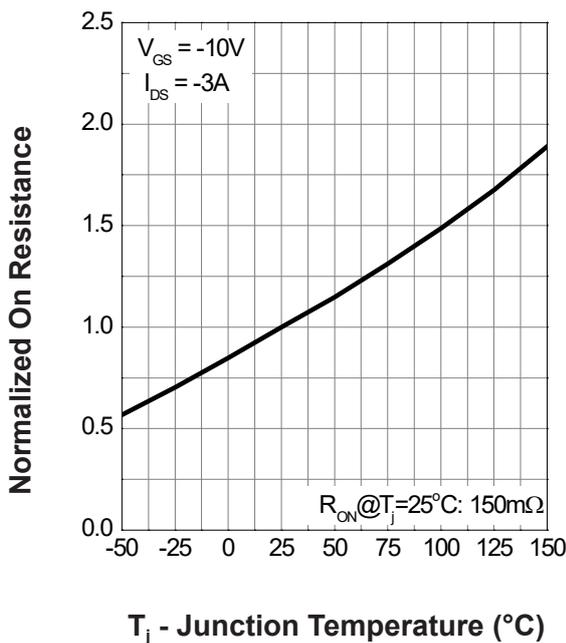
Gate-Source On Resistance



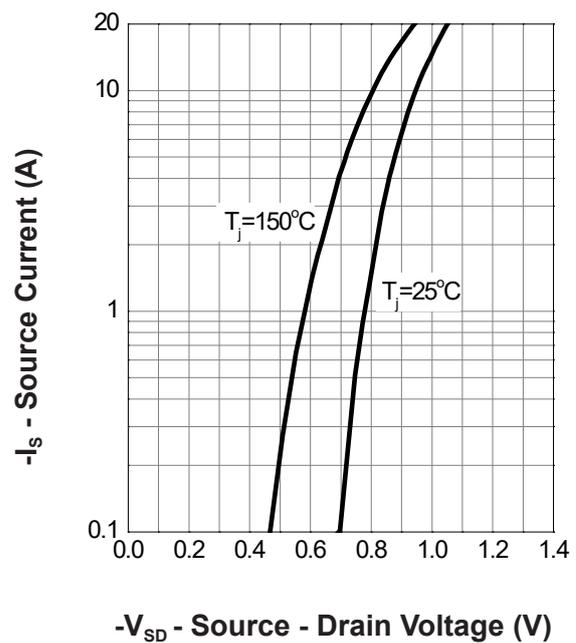
Gate Threshold Voltage



Drain-Source On Resistance

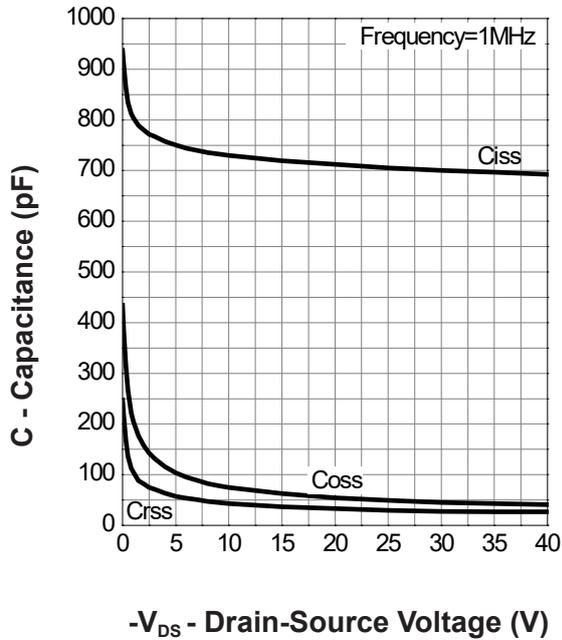


Source-Drain Diode Forward

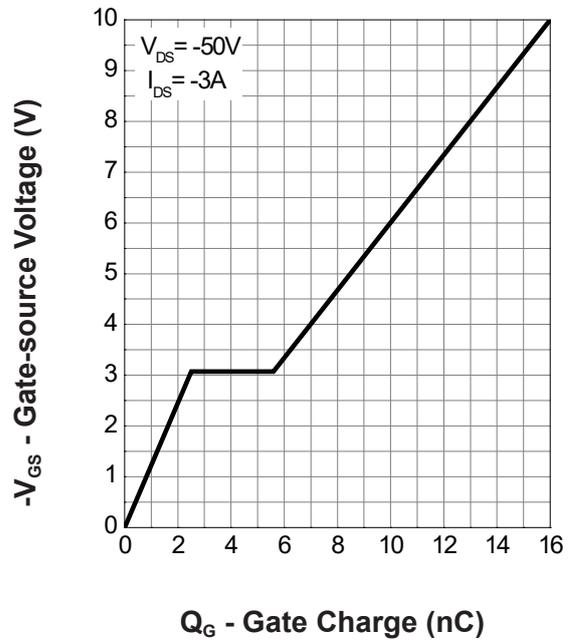


P-Channel Typical Characteristics (Cont.)

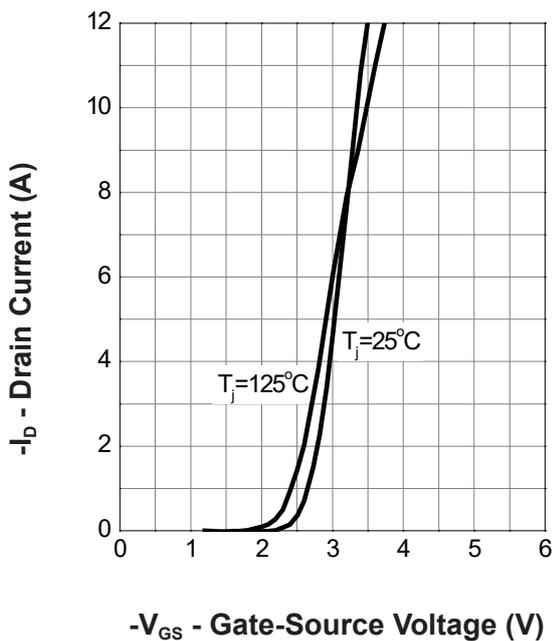
Capacitance

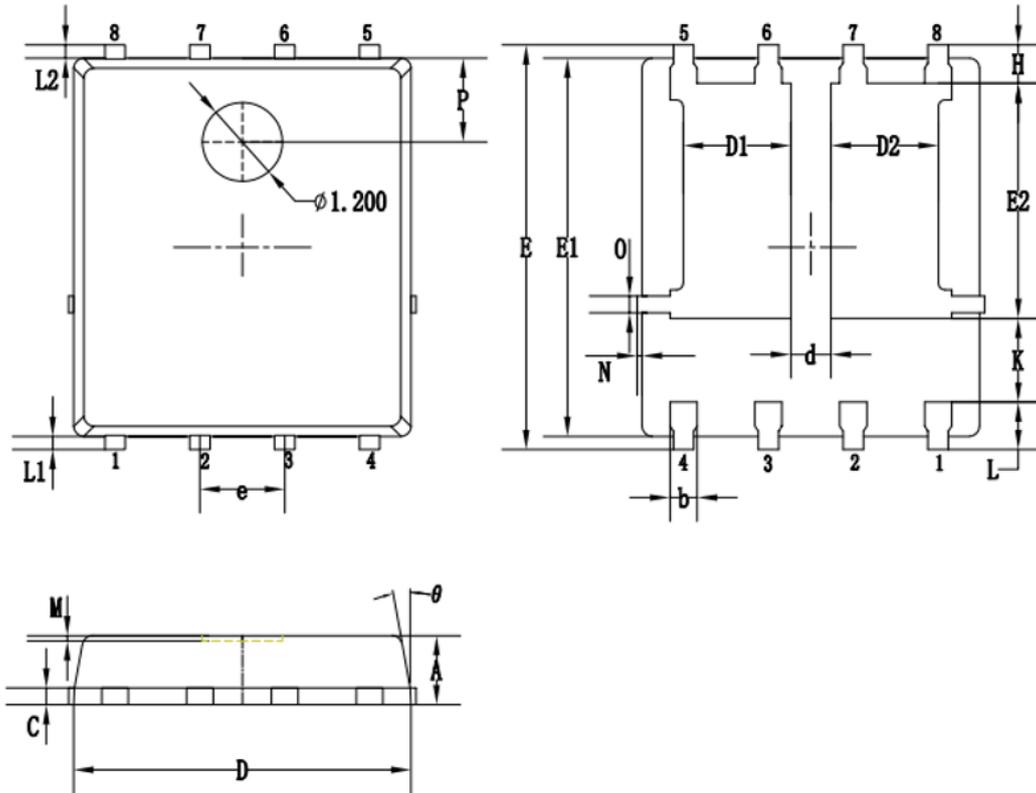


Gate Charge



Transfer Characteristics



Packaging information


SYMBOLS	MILLIMETERS		
	MIN.	NOM.	MAX.
A	0.90	1.05	1.20
b	0.35	0.40	0.50
C	0.20	0.25	0.35
D	4.90	5.05	5.20
D1/D2	1.51	1.61	1.71
d	0.50	0.60	0.70
E	6.00	6.15	6.30
E1	5.60	5.75	5.90
E2	3.47	3.57	3.67
e	1.27 BSC.		
H	0.48	0.58	0.68
K	1.17	1.27	1.37
L	0.64	0.74	0.84
L1/L2	0.20 REF.		
θ	8°	10°	12°
M	0.08 REF.		
N	0	-	0.15
O	0.25 REF.		
P	1.28 REF.		

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