WSD23N10DN33

N-Ch and P-Channel MOSFET

General Description

The WSD23N10DN33 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 WSD23N10DN33 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

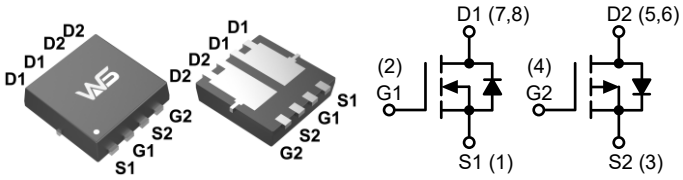
Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
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

DFN3X3-8L 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°C	12	-12	A
	Continuous Drain Current, $V_{GS(NP)}$=10V, T_C=100°C	4.8	-4.8	
I_{DP} [1]	Pulse Drain Current Tested, $V_{GS(NP)}$=10V	36	-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°C	17.8	17.8	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	°C
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	

Thermal Data

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$ [2]	Thermal Resistance Junction-Ambient, Steady State	---	85	°C/W
$R_{\theta JC}$	Thermal Resistance-Junction to Case, Steady State	---	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_{DS}=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	---	445	---	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. $R_{\theta JA}$ steady state t=999s. $R_{\theta JA}$ is measured with the device mounted on 1in^2, FR-4 board with 2oz. Copper.
3. UIS tested and pulse width limited by maximum junction temperature 150°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_{DS}=-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} [4]	Diode Forward Voltage	V_{GS}=0V , I_S=-3A , T_J=25°C	---	---	-1.2	V

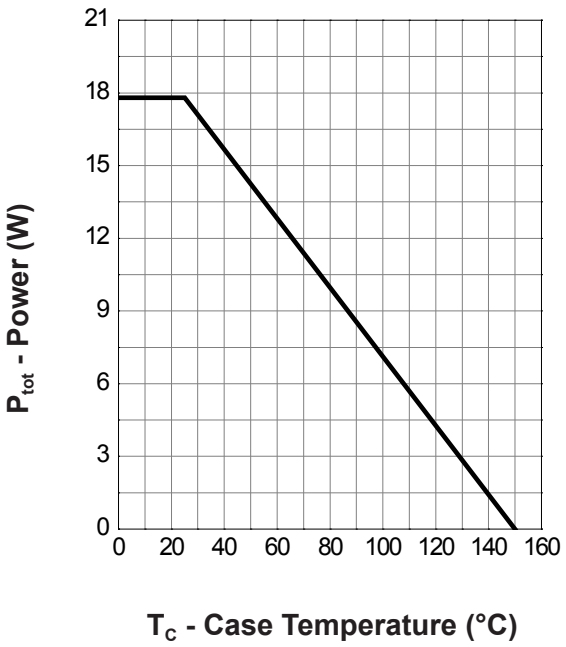
Note:

*. Max. current is limited by bonding wire.

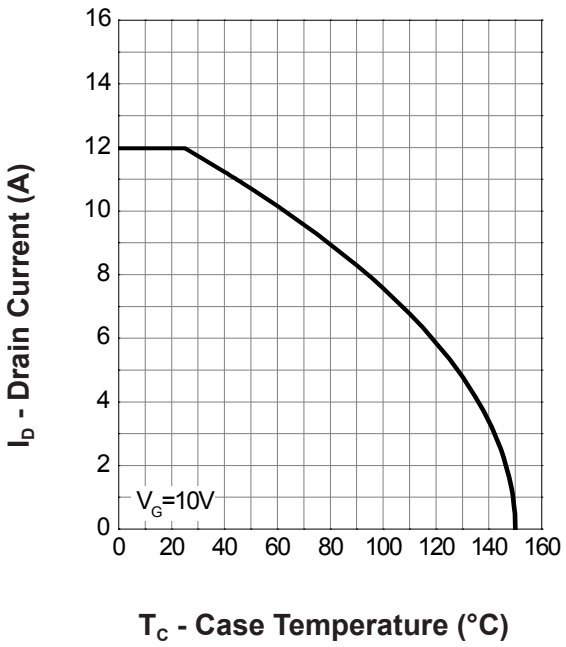
1. Pulse width limited by max. junction temperature.
2. $R_{\theta JA}$ steady state t=999s. $R_{\theta JA}$ is measured with the device mounted on 1in^2, FR-4 board with 2oz. Copper.
3. UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T_J=25°C).
4. Pulse test ; pulse width ≤ 300μs, duty cycle ≤ 2%.
5. Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

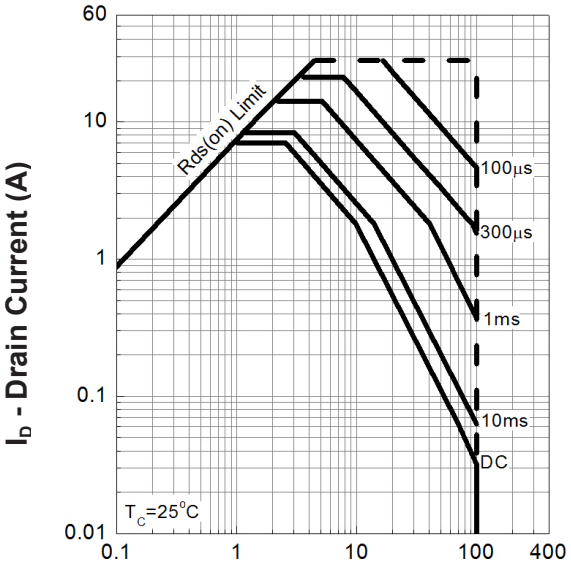
Power Dissipation



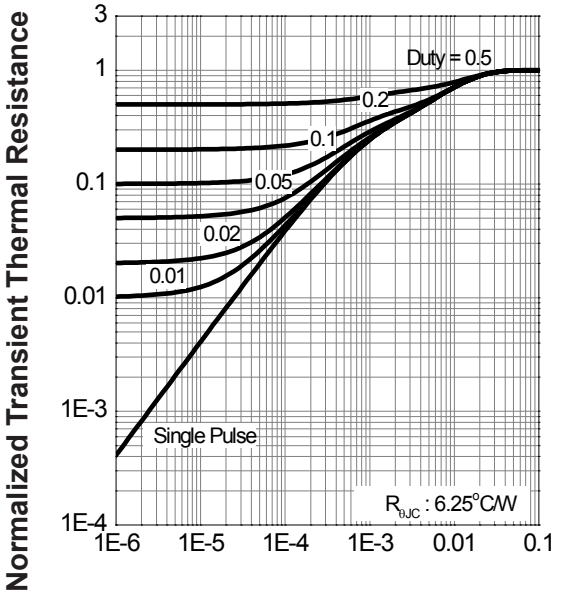
Drain Current



Safe Operation Area

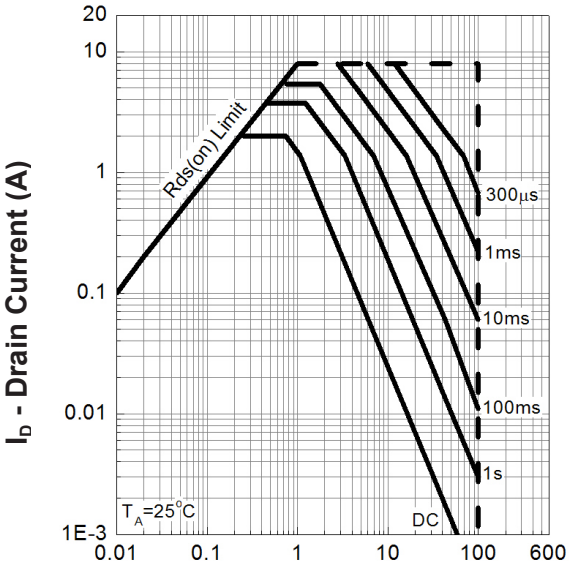


Thermal Transient Impedance

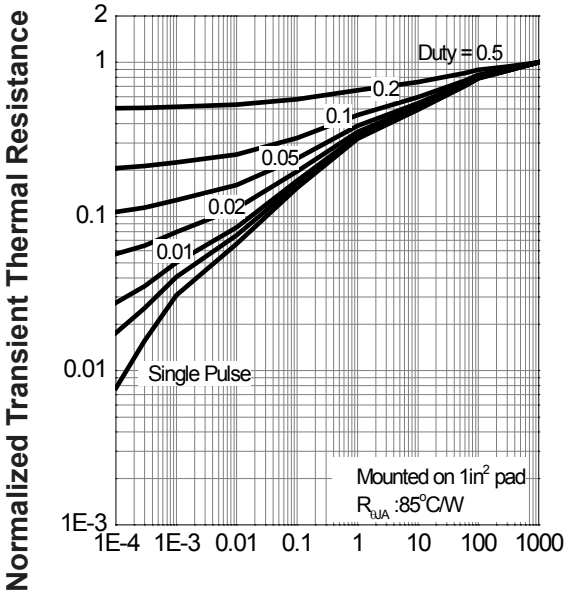


N-Channel Typical Characteristics (Cont.)

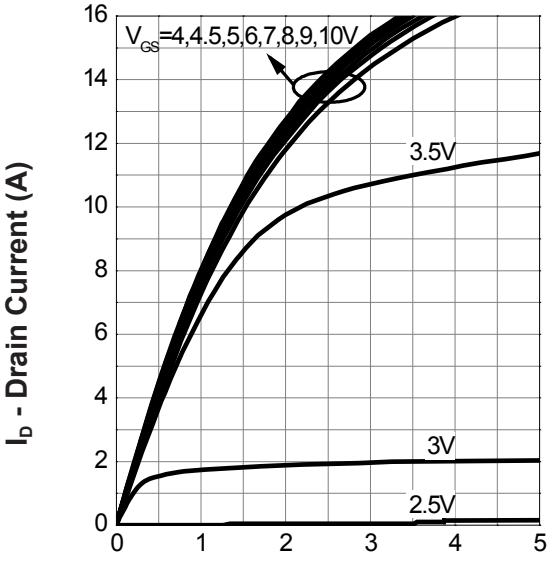
Safe Operation Area



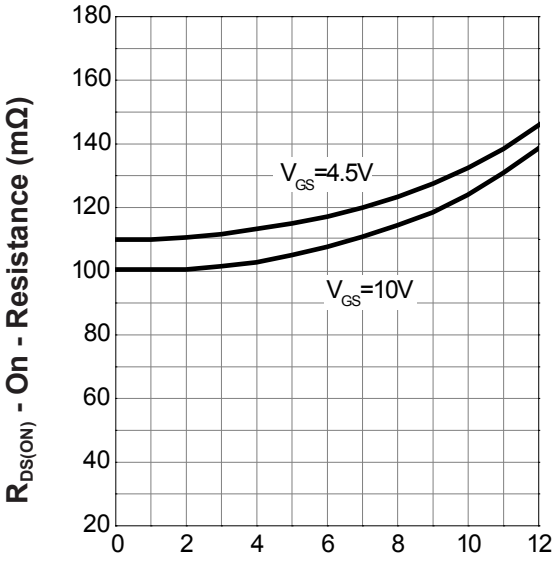
Thermal Transient Impedance



Output Characteristics

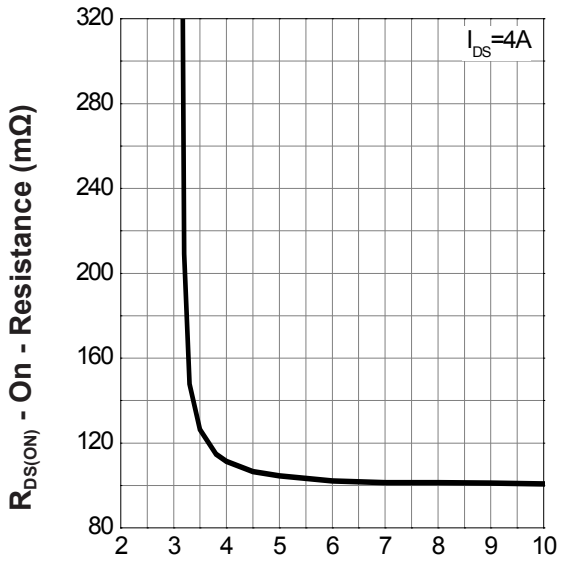


Drain-Source On Resistance

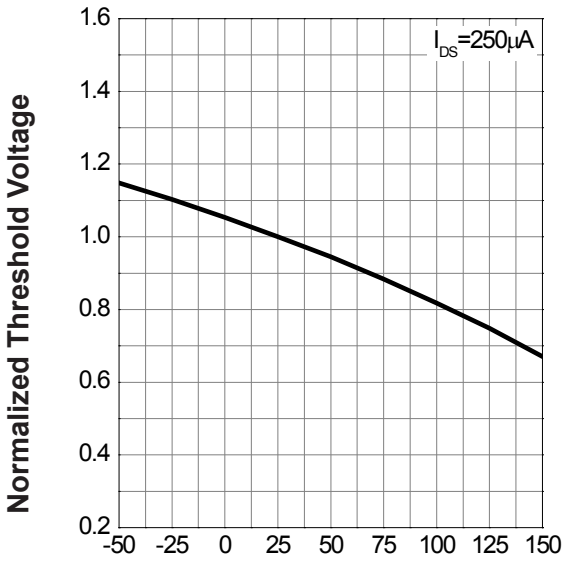


N-Channel Typical Characteristics (Cont.)

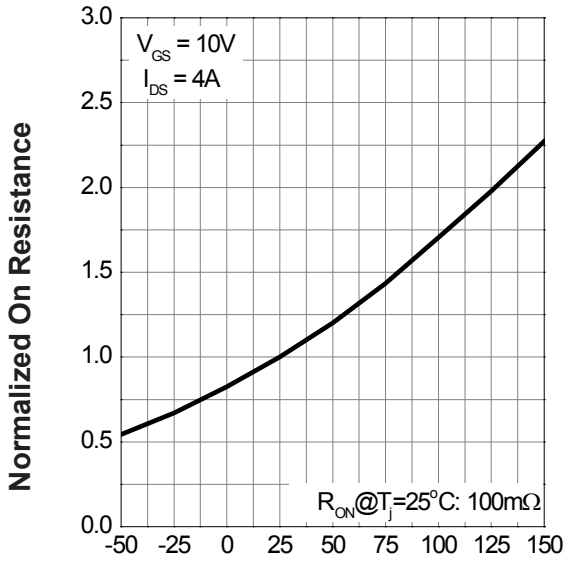
Gate-Source On Resistance



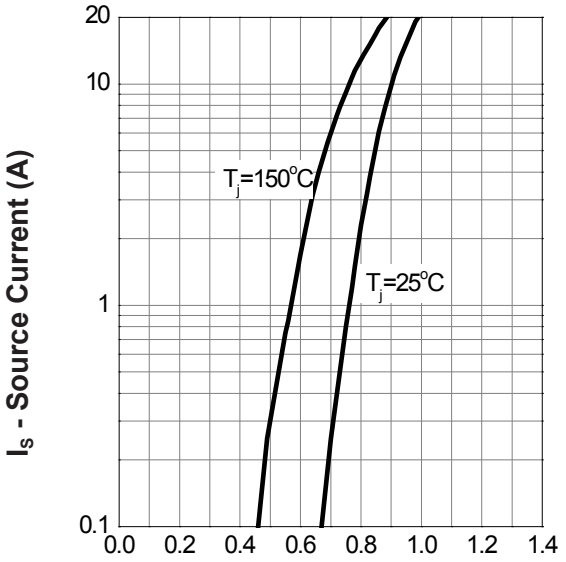
Gate Threshold Voltage



Drain-Source On Resistance

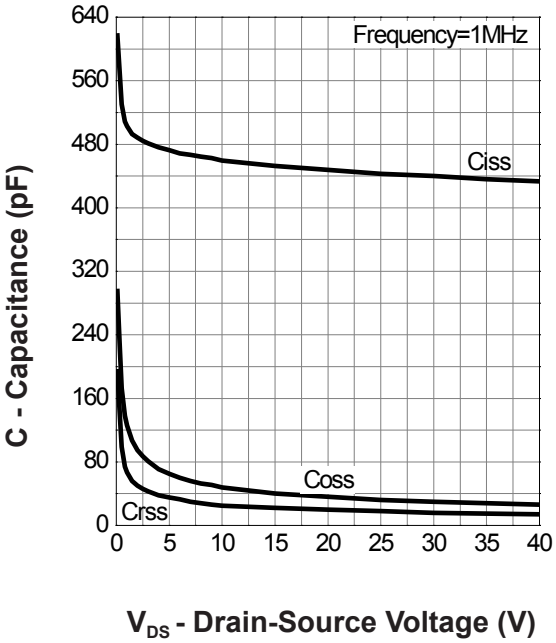


Source-Drain Diode Forward

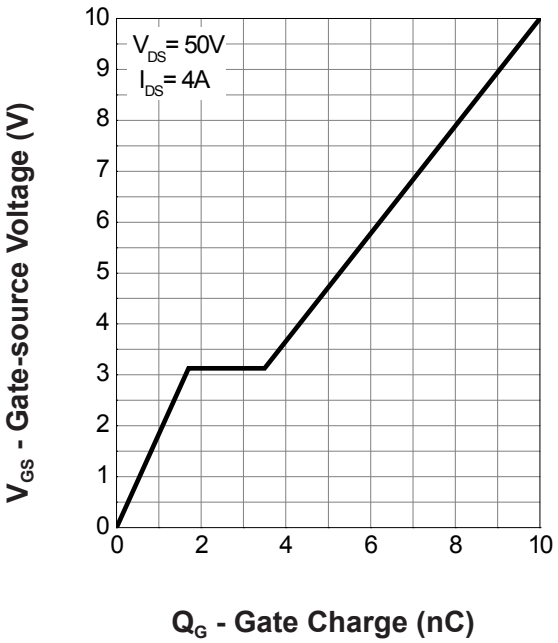


N-Channel Typical Characteristics (Cont.)

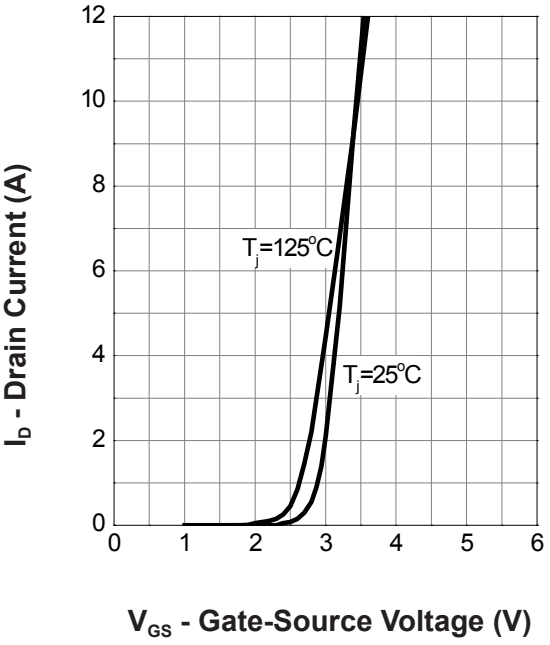
Capacitance



Gate Charge

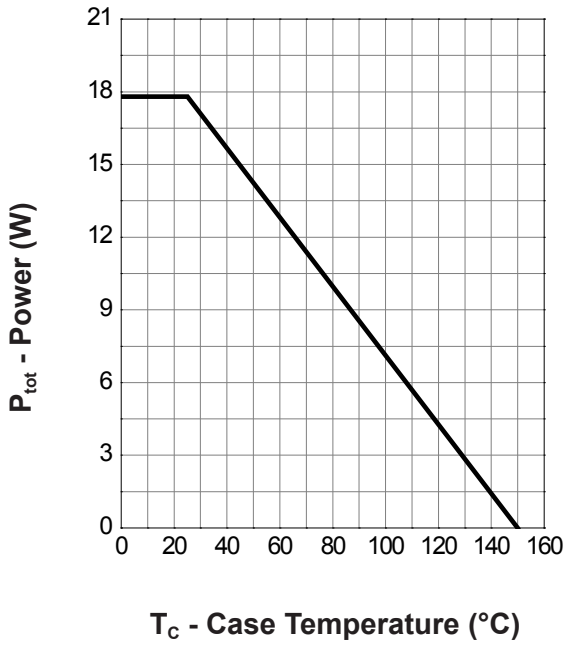


Transfer Characteristics

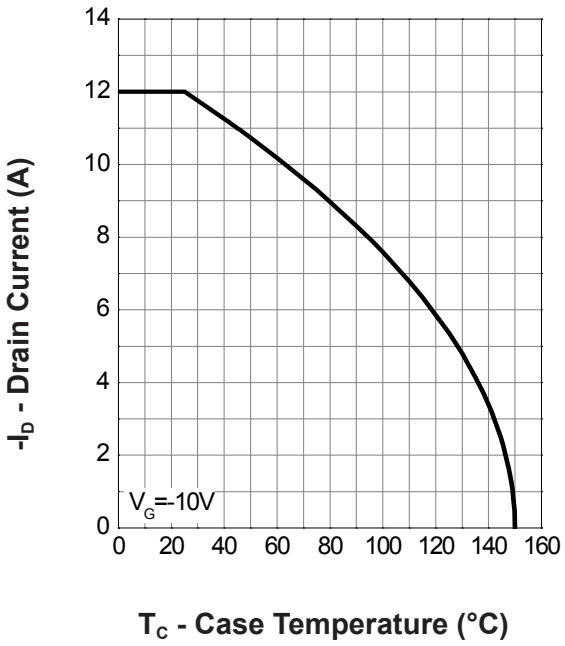


P-Channel Typical Characteristics

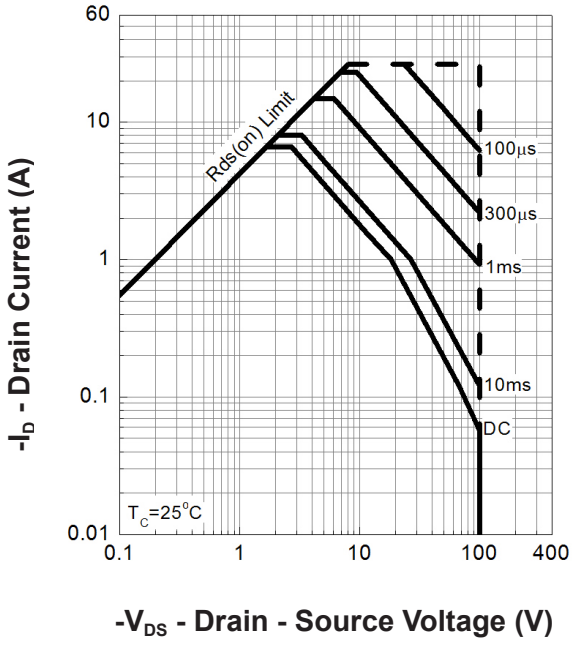
Power Dissipation



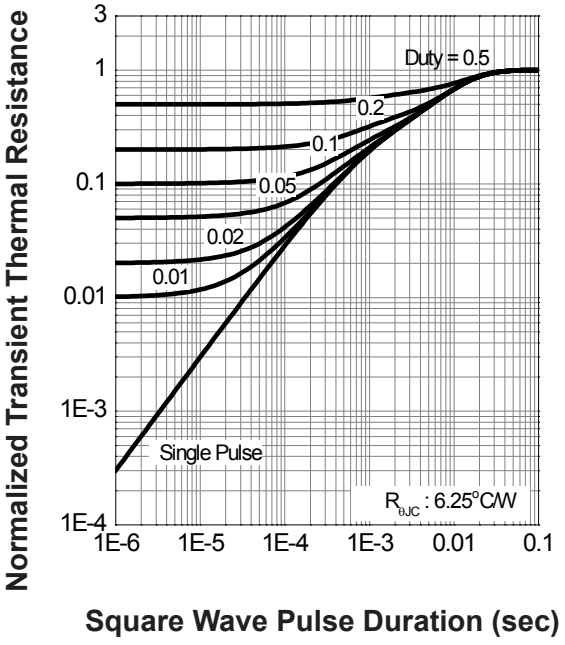
Drain Current



Safe Operation Area

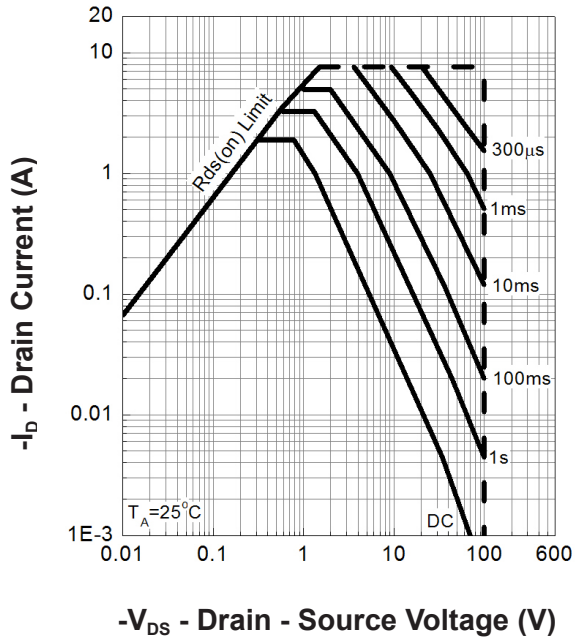


Thermal Transient Impedance

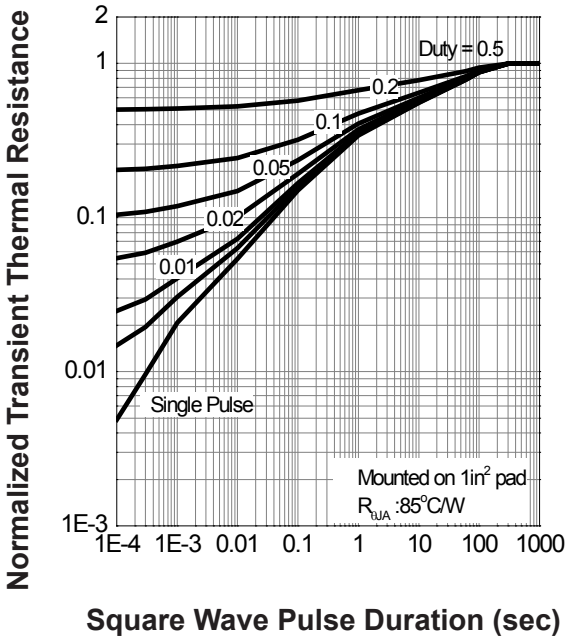


P-Channel Typical Characteristics (Cont.)

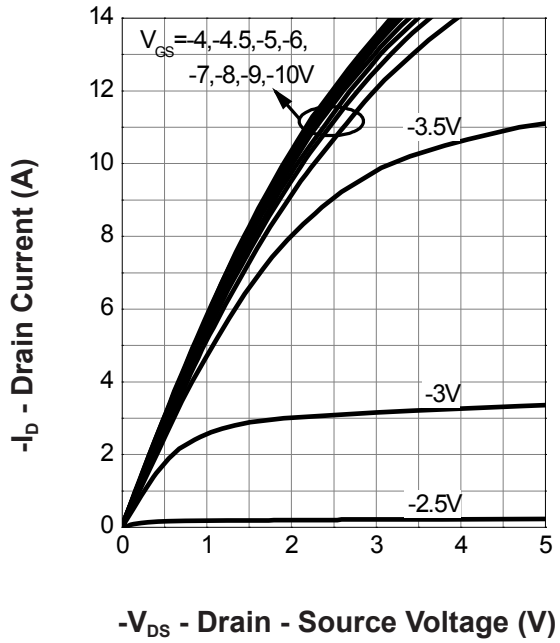
Safe Operation Area



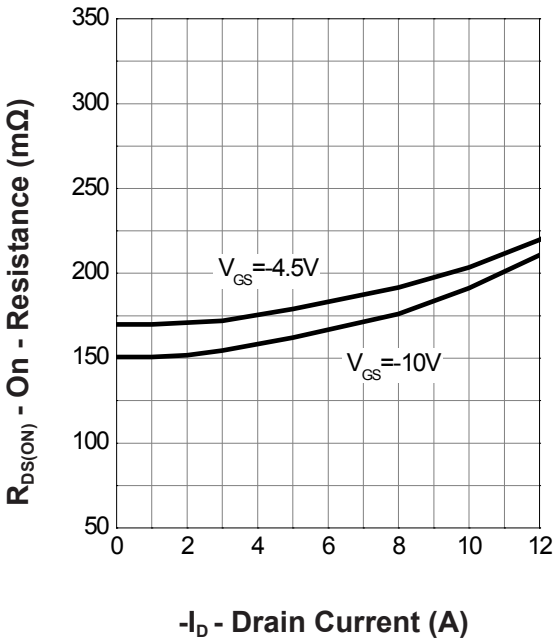
Thermal Transient Impedance



Output Characteristics

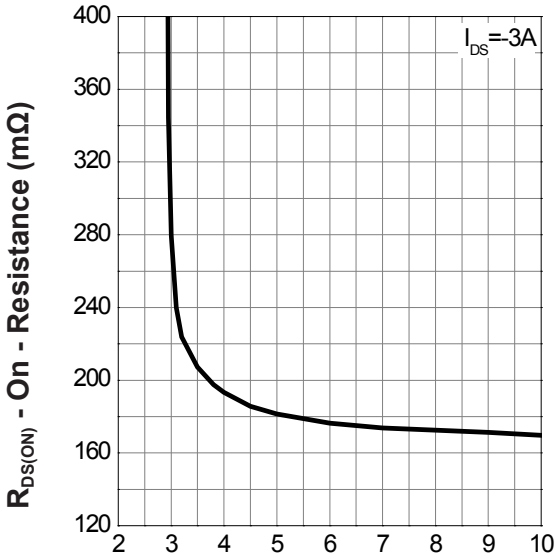


Drain-Source On Resistance

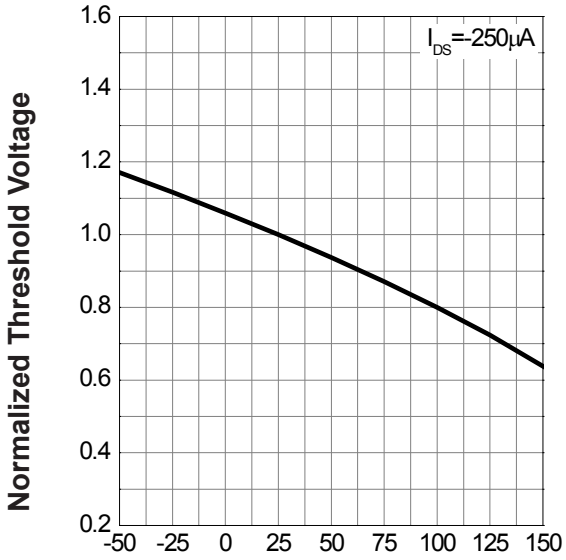


P-Channel Typical Characteristics (Cont.)

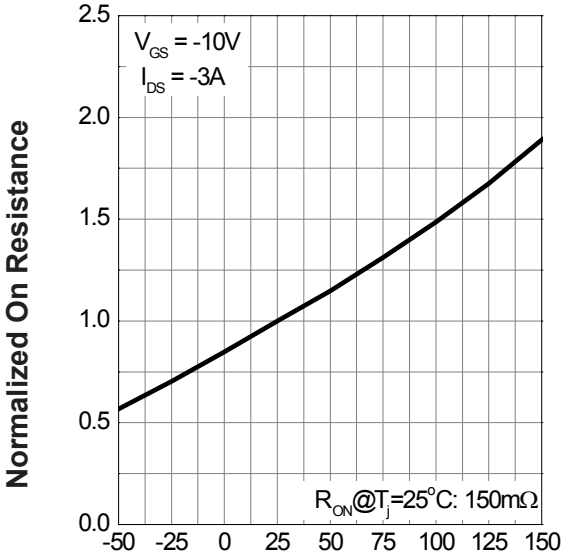
Gate-Source On Resistance



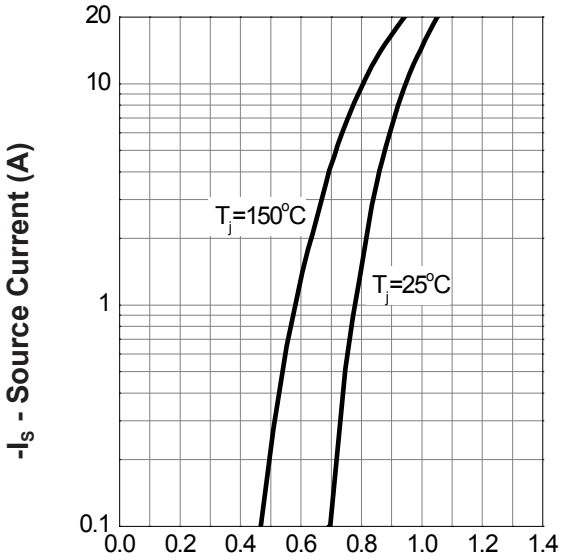
Gate Threshold Voltage



Drain-Source On Resistance

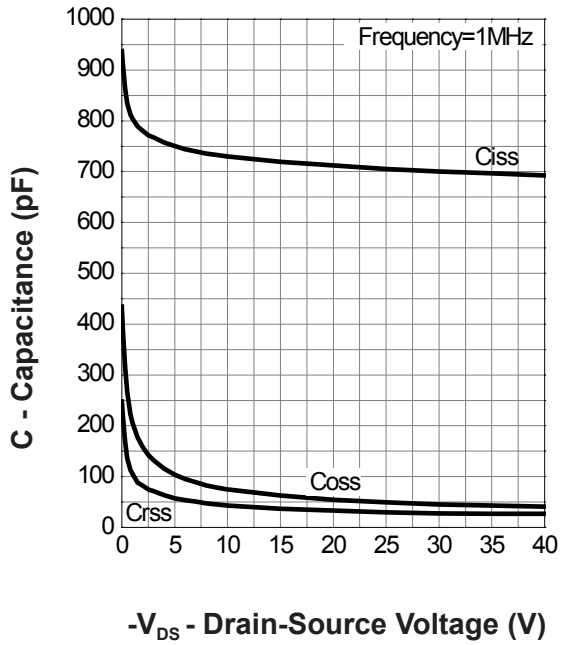


Source-Drain Diode Forward

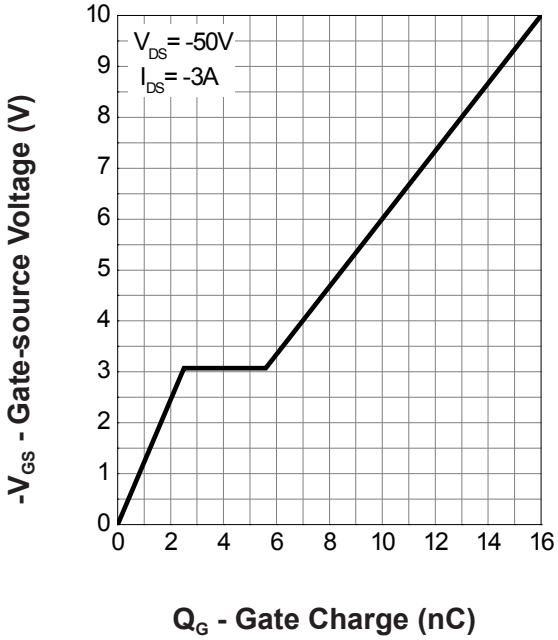


P-Channel Typical Characteristics (Cont.)

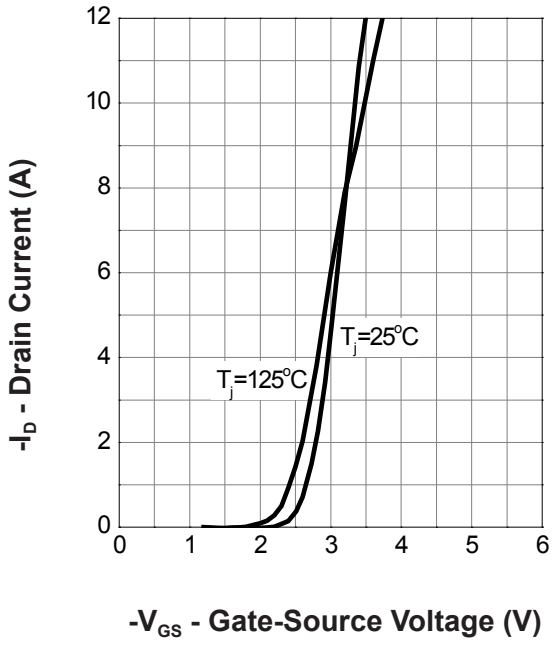
Capacitance



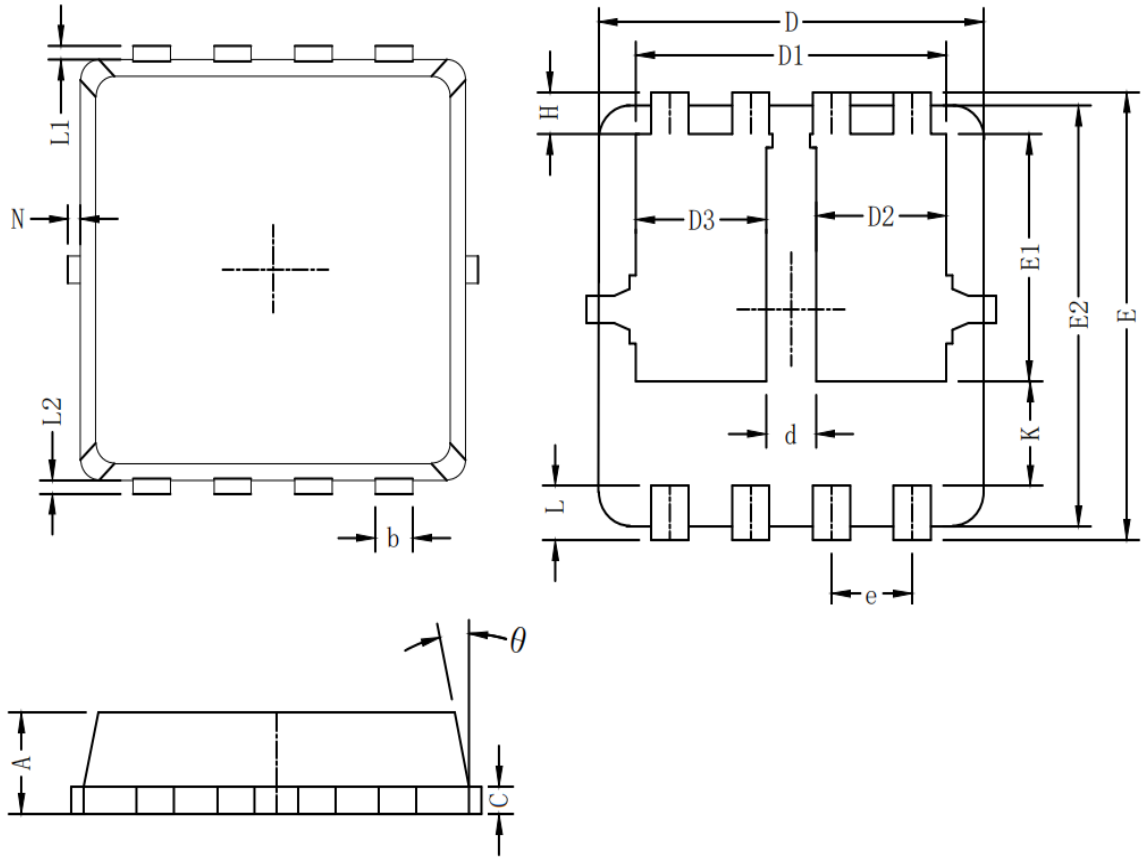
Gate Charge



Transfer Characteristics



Packaging information



Symbol	Dim in mm		
	min	typ	max
A	0.6	0.75	0.9
b	0.2	0.3	0.4
C	0.15	0.2	0.25
D	3	3.1	3.2
D1	2.3	2.45	2.6
D2/D3	0.8	1	1.2
E	3.15	3.3	3.45
E1	1.43	1.73	1.93
E2	2.9	3.05	3.2
e	0.65BSC		
H	0.2	0.35	0.5
K	0.57	0.77	0.87
L	0.3	0.4	0.5
L1/L2	0.1REF		
θ	8°	10°	13°
N	0		0.15
d	0.3	0.4	0.5

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