WSD6034DN33

N-Ch and P-Channel MOSFET

General Description

The WSD6034DN33 is the highest performance trench N-Ch and P-Channel MOSFET with extreme high cell density, which provide excellent $R_{DS(ON)}$ and gate charge for most of the synchronous buck converter applications .

The WSD6034DN33 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% EAS Guaranteed
- Green Device Available

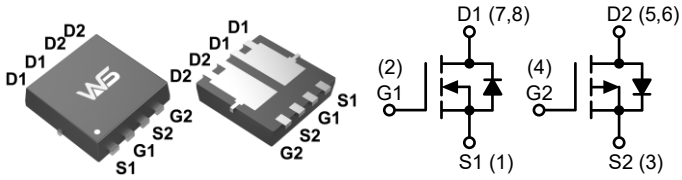
Product Summery

BV_{DSS}	$R_{DS(ON)}$	I_D
60V	35mΩ	15A
-60V	80mΩ	-10A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter.
- Networking DC-DC Power System
- Load Switch

DFN3X3-8L Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V_{DS}	Drain-Source Voltage	60	-60	V
V_{GS}	Gate-Source Voltage	±20	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	15	-10	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	6	-4	A
I_{DM}	Pulsed Drain Current[2]	45	-30	A
EAS	Single Pulse Avalanche Energy[3]	16	18	mJ
I_{AS}	Avalanche Current	8	-9	A
P_D@T_C=25℃	Total Power Dissipation[4]	13.3	13.3	W
T_{STG}	Storage Temperature Range	-55 to 150	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	-55 to 150	℃

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient [1]	---	85	℃/W
$R_{\theta JC}$	Thermal Resistance Junction-Case[1]	---	50	℃/W

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	60	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.063	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=10V , I_D=5A	---	35	40	mΩ
		V_{GS}=4.5V , I_D=3A	---	40	48	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.0	2.0	3.0	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5.24	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=48V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=48V , V_{GS}=0V , T_J=85℃	---	---	30	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=5V , I_D=5A	---	21	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	3.0	---	Ω
Q_g	Total Gate Charge (4.5V)	V_{DS}=30V , V_{GS}=10V , I_D=5A	---	4.3	---	nC
Q_{gs}	Gate-Source Charge		---	1.6	---	
Q_{gd}	Gate-Drain Charge		---	1.5	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=30V , V_{GS}=10V , R_G=6Ω, I_D=1A	---	7	13	ns
T_r	Rise Time		---	7	13	
$T_{d(off)}$	Turn-Off Delay Time		---	5	9	
T_f	Fall Time		---	18	33	
C_{iss}	Input Capacitance	V_{DS}=15V , V_{GS}=0V , f=1MHz	---	400	520	pF
C_{oss}	Output Capacitance		---	43	---	
C_{rss}	Reverse Transfer Capacitance		---	24	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	15	A
I_{SM}	Pulsed Source Current[2,6]		---	---	45	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=1.7A,T_J=25℃	---	0.8	1.3	V

Note :

1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper,t<10sec.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3.The EAS data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.5mH,I_{AS}=8A

4.The power dissipation is limited by 150℃ junction temperature

5.The Min. value is 100% EAS tested guarantee.

6.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

P-Channel Electrical Characteristics (T_A=25°C, Unless Otherwise Noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=-250uA	-60	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=-1mA	---	-0.03	---	V/℃
$R_{DS(ON)}$	Static Drain-Source On-Resistance[2]	V_{GS}=-10V , I_D=-3.5A	---	80	93	mΩ
		V_{GS}=-4.5V , I_D=-2.1A	---	100	128	
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =-250uA	-1.0	-2.0	-3.0	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.56	---	mV/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-48V , V_{GS}=0V , T_J=25℃	---	---	-1	uA
		V_{DS}=-48V , V_{GS}=0V , T_J=85℃	---	---	-30	
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
gfs	Forward Transconductance	V_{DS}=-5V , I_D=-4.5A	---	15	---	S
R_g	Gate Resistance	V_{DS}=0V , V_{GS}=0V , f=1MHz	---	11	---	Ω
Q_g	Total Gate Charge (-4.5V)	V_{DS}=-30V , V_{GS}=-10V , I_D=-3.5A	---	5.2	---	nC
Q_{gs}	Gate-Source Charge		---	1.9	---	
Q_{gd}	Gate-Drain Charge		---	2.1	---	
$T_{d(on)}$	Turn-On Delay Time	V_{DD}=-30V , V_{GS}=-10V , R_G=6Ω, I_D=-1A,	---	4	7	ns
T_r	Rise Time		---	8	14	
$T_{d(off)}$	Turn-Off Delay Time		---	22	40	
T_f	Fall Time		---	39	70	
C_{iss}	Input Capacitance	V_{DS}=-30V , V_{GS}=0V , f=1MHz	---	455	592	pF
C_{oss}	Output Capacitance		---	51	---	
C_{rss}	Reverse Transfer Capacitance		---	32	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current[1,6]	V_G=V_D=0V , Force Current	---	---	-15	A
I_{SM}	Pulsed Source Current[2,6]		---	---	-50	A
V_{SD}	Diode Forward Voltage[2]	V_{GS}=0V , I_S=-1.5A , T_J=25℃	---	-0.8	-1.0	V

Note :

1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper,t<10sec.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

3.The EAS data shows Max. rating . The test condition is V_{DD}=-25V,V_{GS}=-10V,L=0.5mH,I_{AS}=-9A

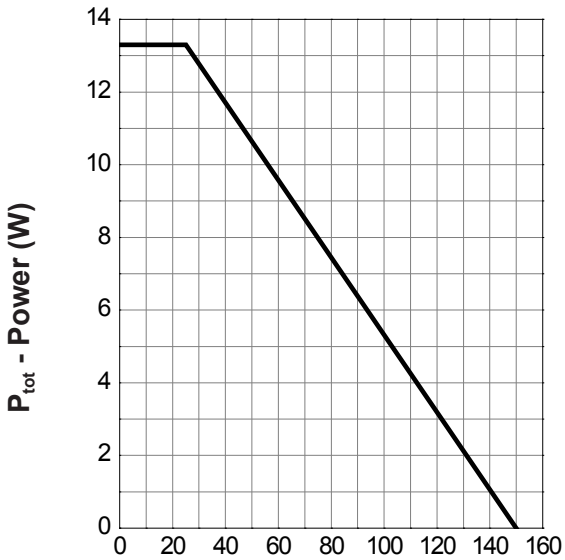
4.The power dissipation is limited by 150℃ junction temperature

5.The Min. value is 100% EAS tested guarantee.

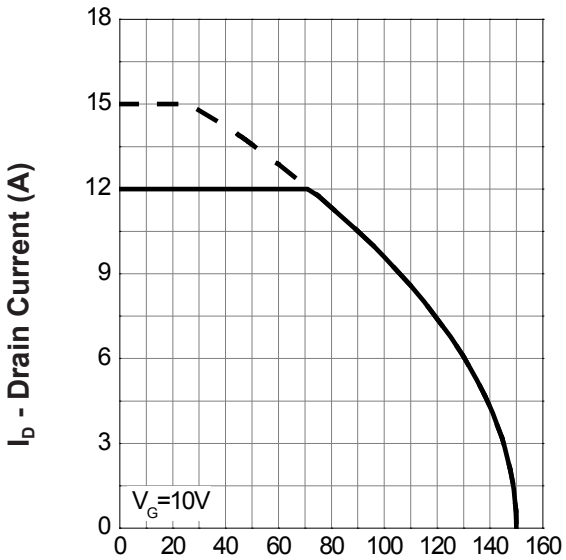
6.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

N-Channel Typical Characteristics

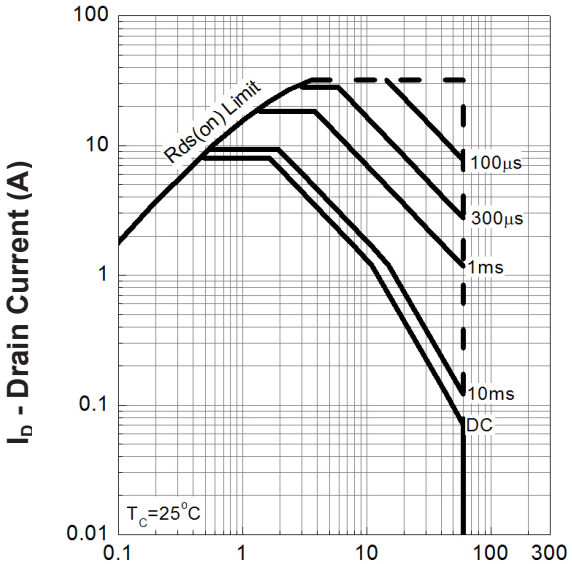
Power Dissipation



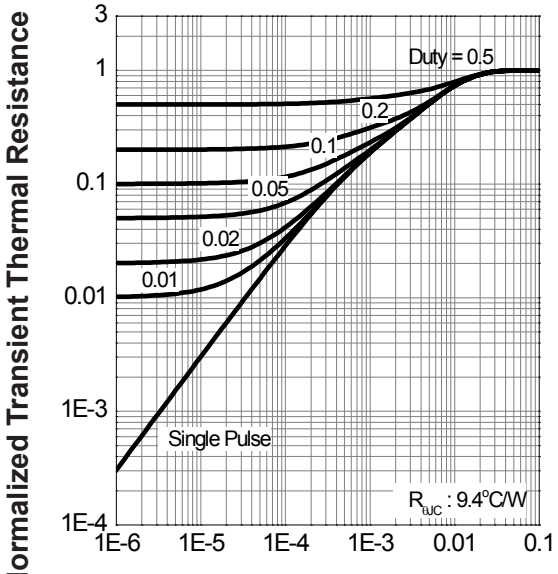
Drain Current



Safe Operation Area

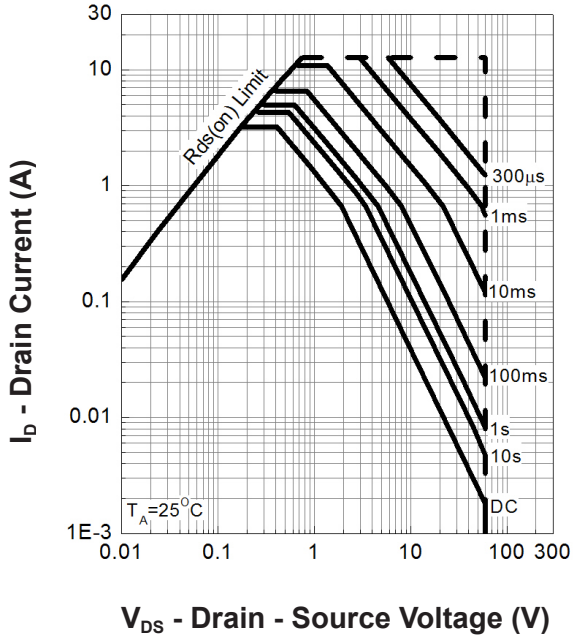


Thermal Transient Impedance

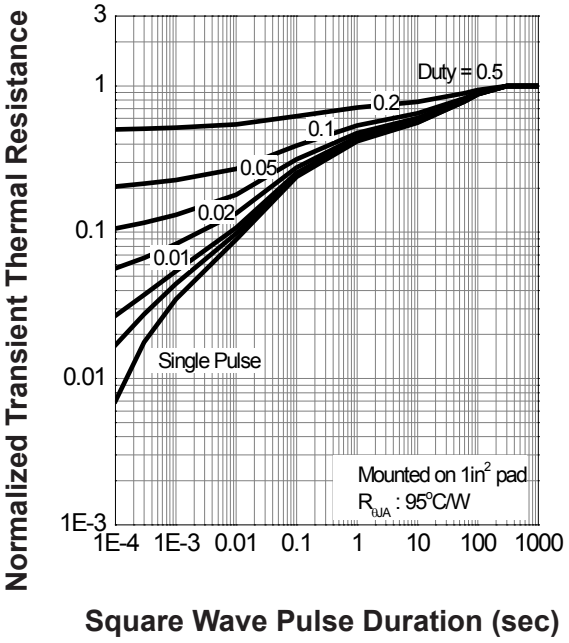


N-Channel Typical Characteristics (Cont.)

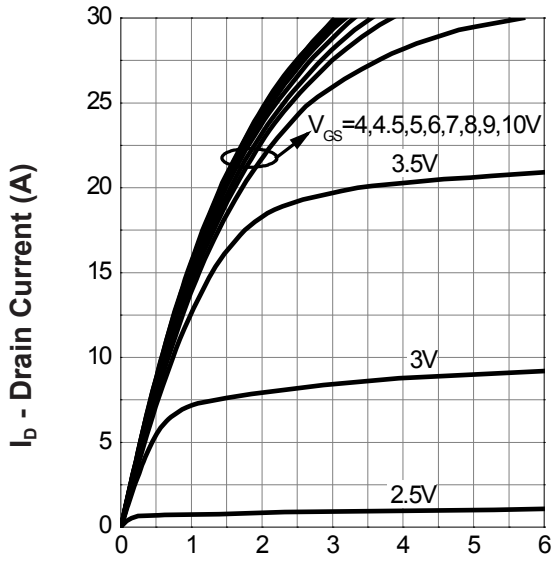
Safe Operation Area



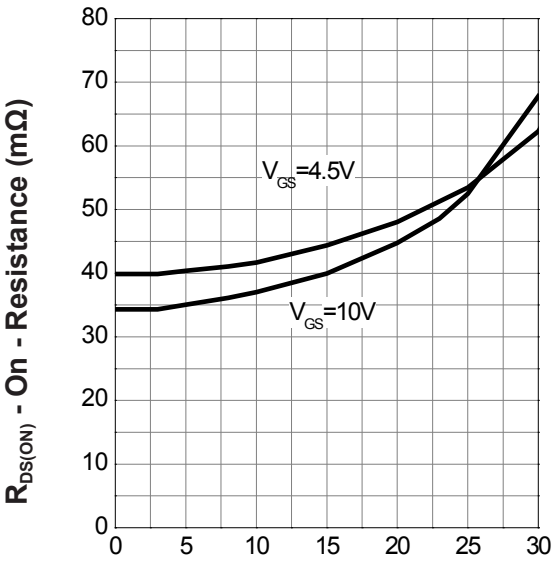
Thermal Transient Impedance



Output Characteristics

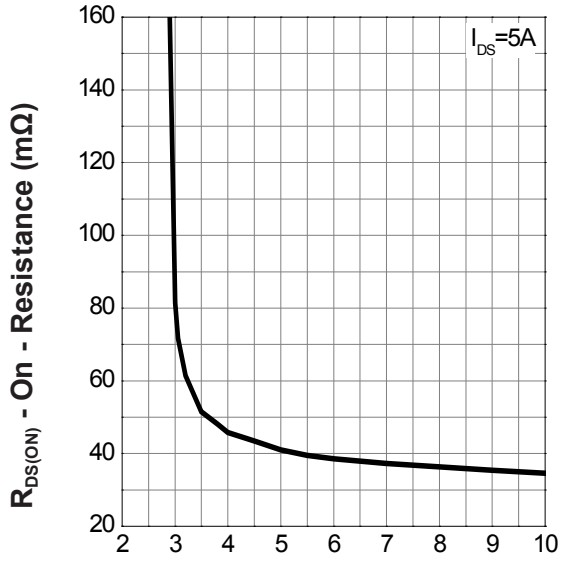


Drain-Source On Resistance

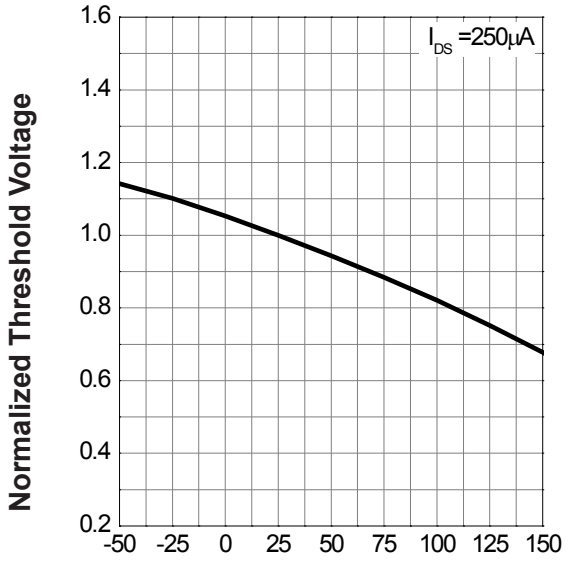


N-Channel Typical Characteristics (Cont.)

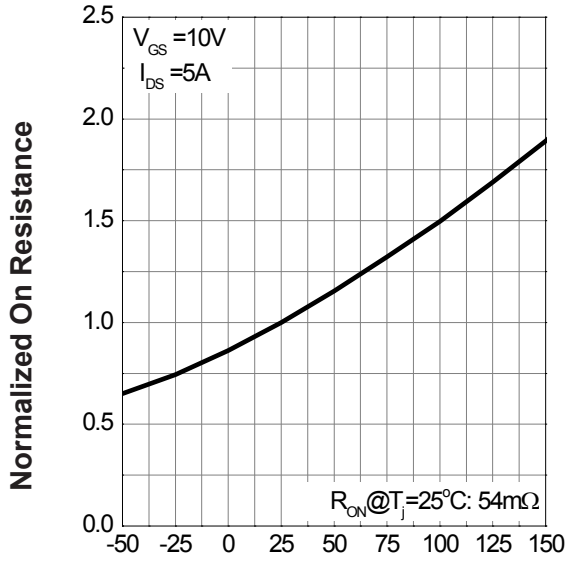
Gate-Source On Resistance



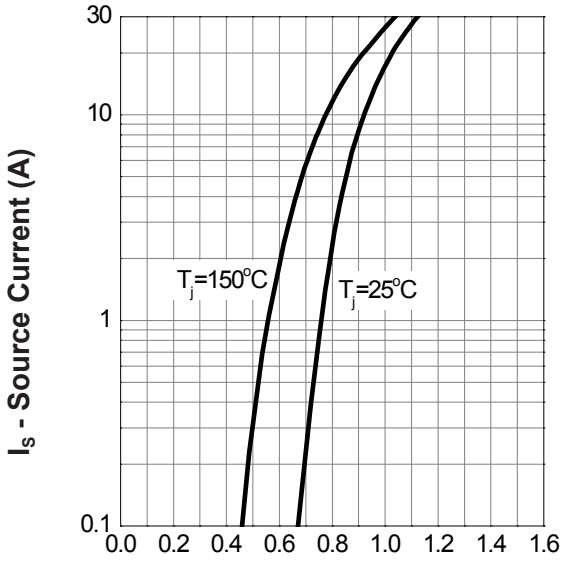
Gate Threshold Voltage



Drain-Source On Resistance

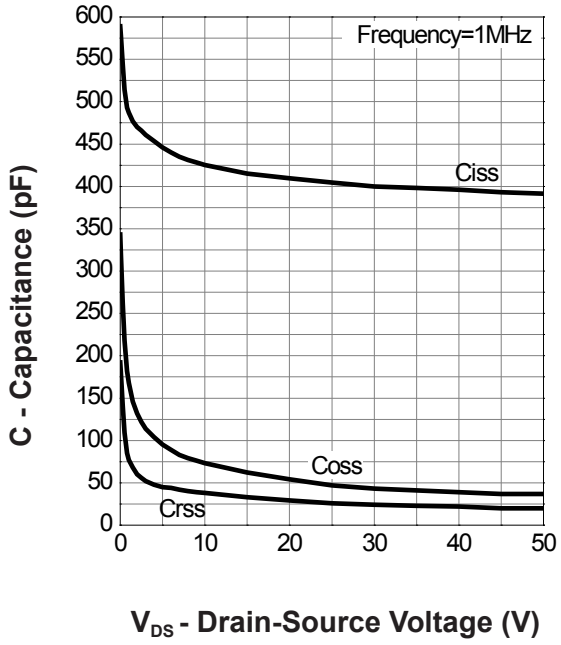


Source-Drain Diode Forward

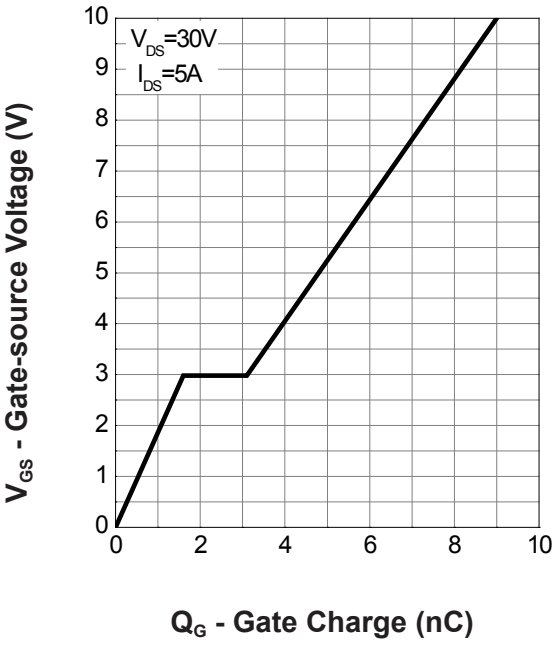


N-Channel Typical Characteristics (Cont.)

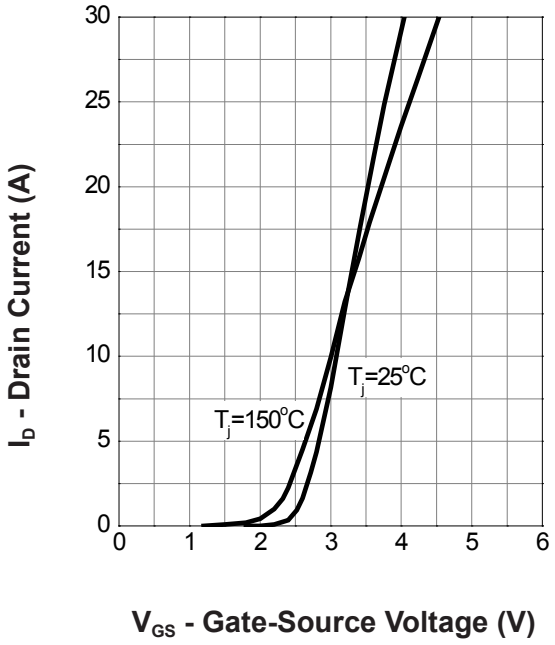
Capacitance



Gate Charge

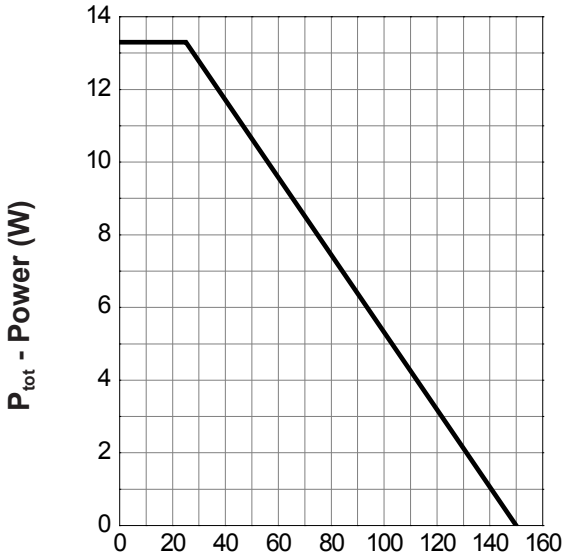


Transfer Characteristics

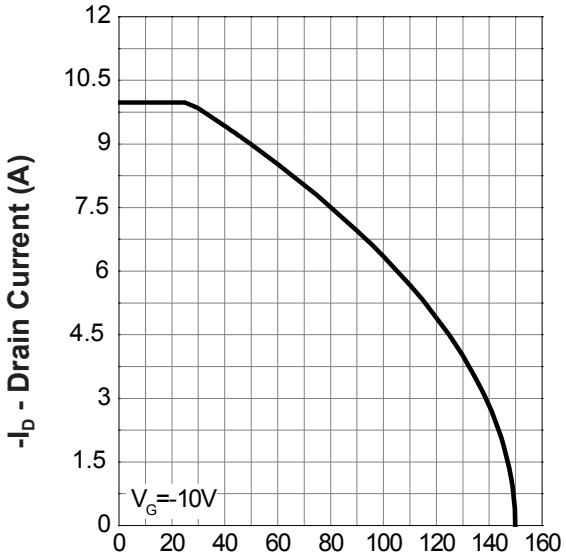


P-Channel Typical Characteristics

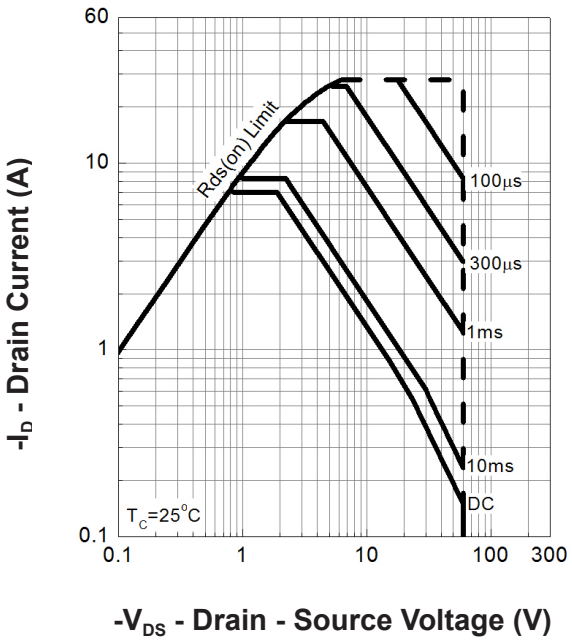
Power Dissipation



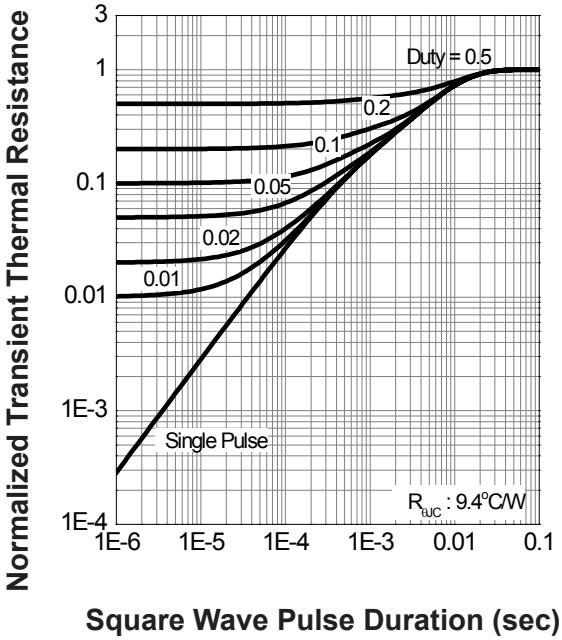
Drain Current



Safe Operation Area

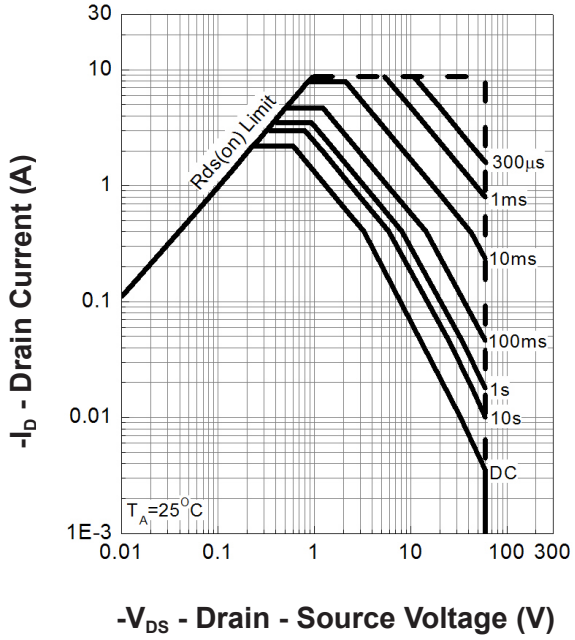


Thermal Transient Impedance

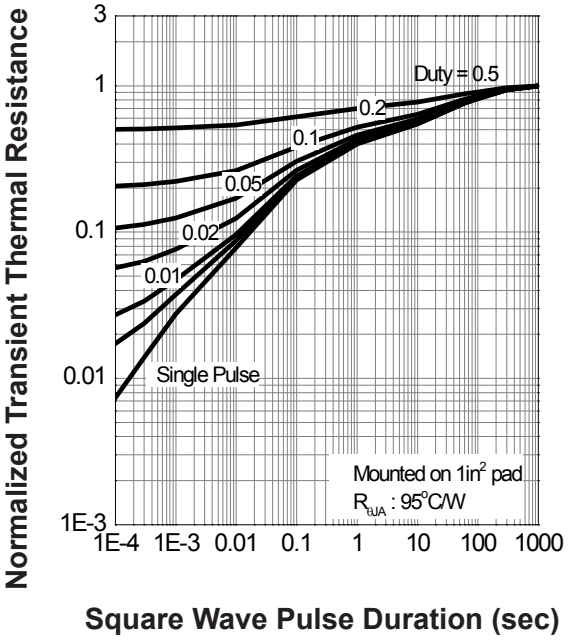


P-Channel Typical Characteristics (Cont.)

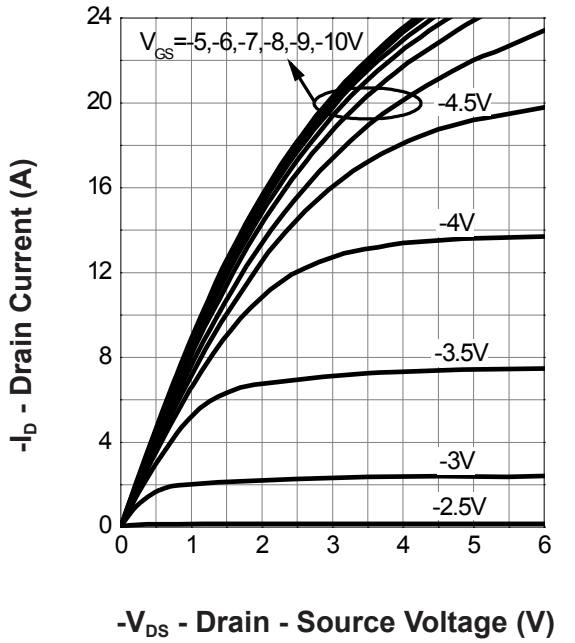
Safe Operation Area



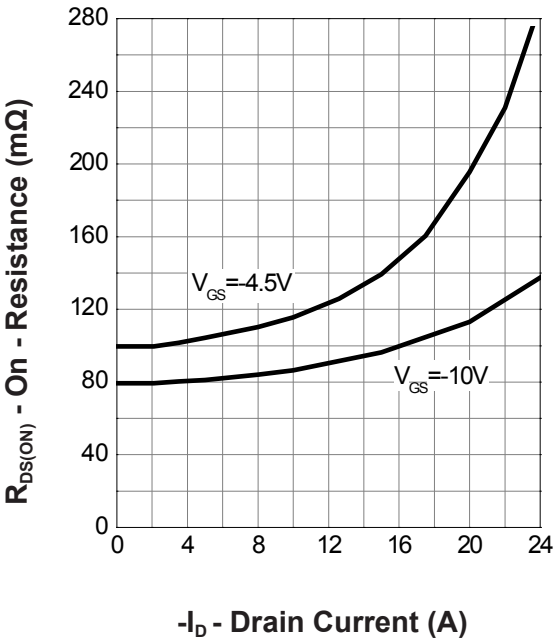
Thermal Transient Impedance



Output Characteristics

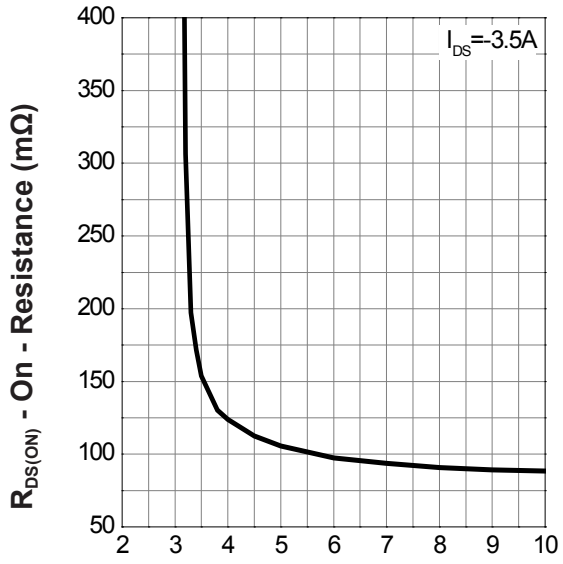


Drain-Source On Resistance

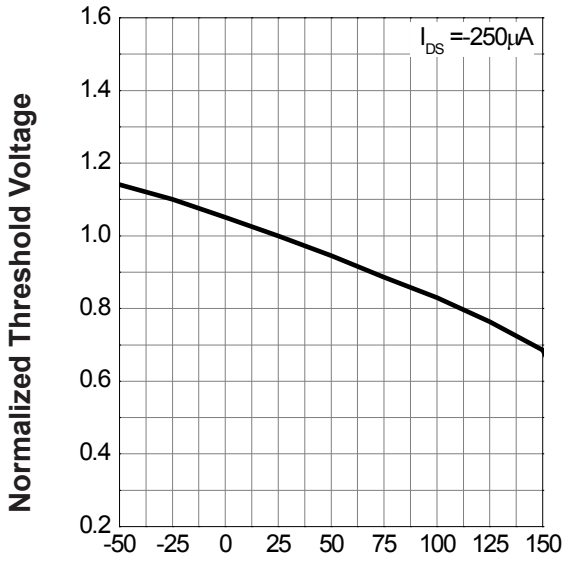


P-Channel Typical Characteristics (Cont.)

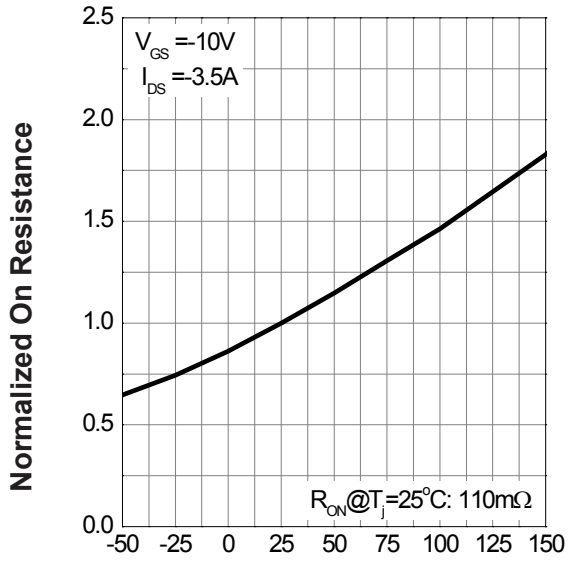
Gate-Source On Resistance



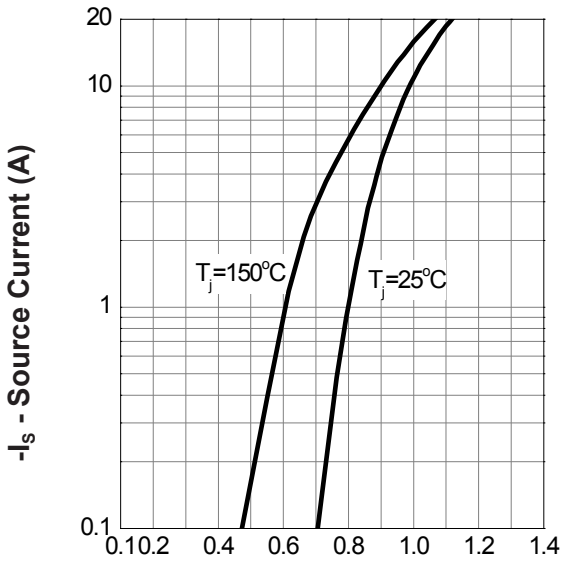
Gate Threshold Voltage



Drain-Source On Resistance

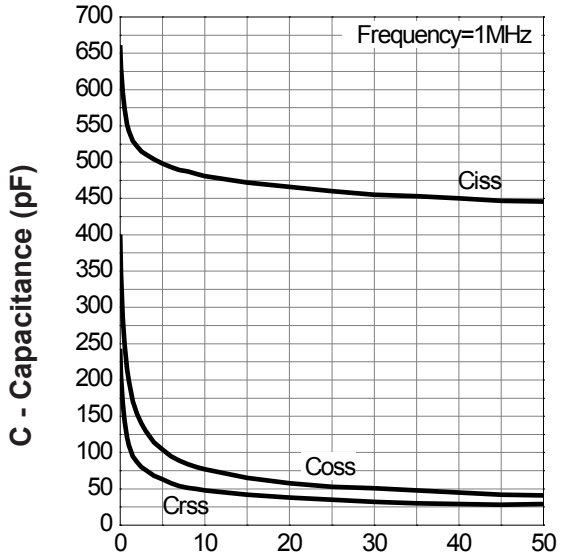


Source-Drain Diode Forward

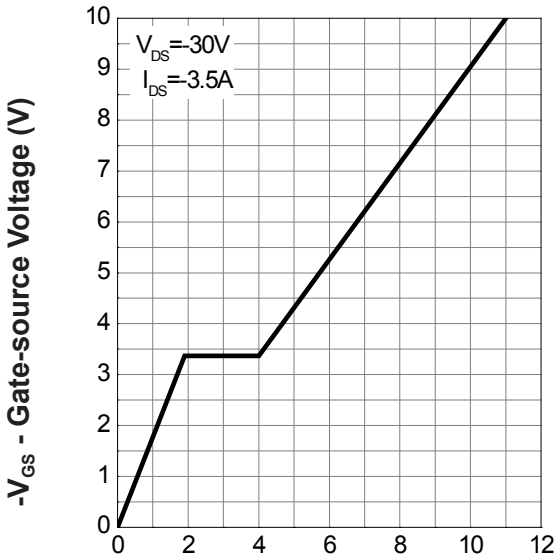


P-Channel Typical Characteristics (Cont.)

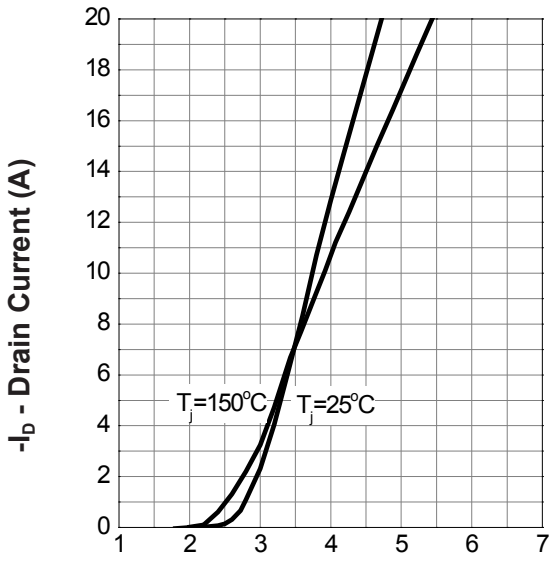
Capacitance



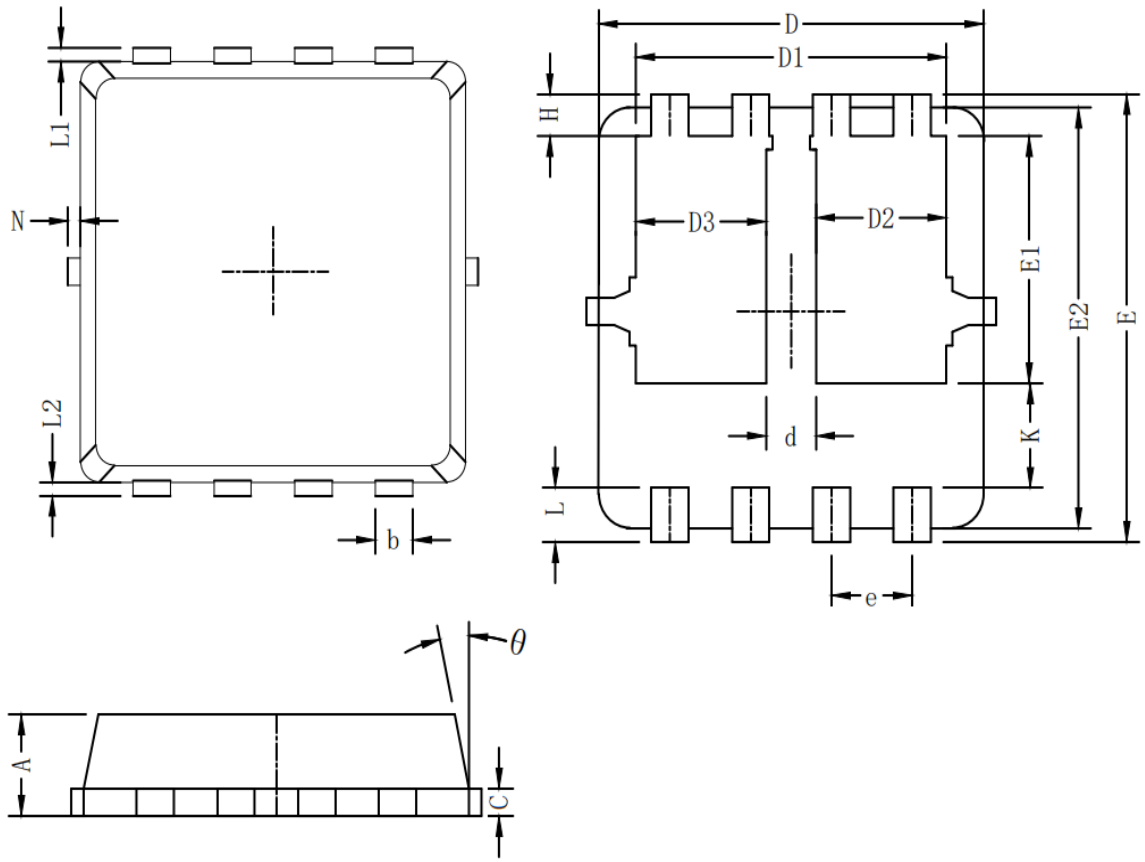
Gate Charge



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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