

General Description

The WSD23N10DN 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 WSD23N10DN 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

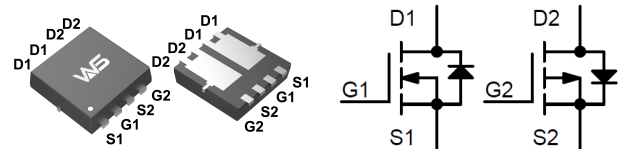
Product Summary

| BVDSS | RDSON | ID |
|-------|-------|------|
| 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

DFN3.3x3.3-8-EP 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, $V_{GS(NP)}=10V, T_c=25^\circ C$ | 12 | -12 | A |
| | Continuous Drain Current, $V_{GS(NP)}=10V, T_c=100^\circ C$ | 4.8 | -4.8 | A |
| I_{DP}^a | Pulse Drain Current Tested, $V_{GS(NP)}=10V$ | 36 | -36 | A |
| E_{AS}^c | Avalanche Energy, Single pulse, L=0.5mH | 6.25 | 20 | mJ |
| I_{AS}^c | 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 | $^\circ C$ |
| $R_{\theta JA}^b$ | 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 | $^\circ C/W$ |

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 $1in^2$, FR-4 board with 2oz. Copper.

Note c : UIS tested and pulse width limited by maximum junction temperature $175^\circ C$ (initial temperature $T_J=25^\circ C$).

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 =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 =250uA | 1.3 | 1.8 | 2.5 | 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 |
| R _g | Gate Resistance | V _{DS} =0V, V _{GS} =0V, f=1MHz | --- | 2.5 | 3.6 | Ω |
| Q _g ^e | Total Gate Charge | V _{DS} =50V, V _{GS} =10V, I _{DS} =4A | --- | 10 | --- | nC |
| Q _{gs} ^e | Gate-Source Charge | | --- | 2.5 | --- | |
| Q _{gd} ^e | Gate-Drain Charge | | --- | 3.3 | --- | |
| T _{d(on)} ^e | Turn-On Delay Time | V _{DD} =30V, R _L =30R, I _{DS} =1A, V _{GEN} =10V , R _G =6R. | --- | 9 | --- | ns |
| T _r ^e | Rise Time | | --- | 7 | --- | |
| T _{d(off)} ^e | Turn-Off Delay Time | | --- | 19 | --- | |
| T _f ^e | Fall Time | | --- | 5 | --- | |
| C _{iss} ^e | Input Capacitance | V _{DS} =30V, V _{GS} =0V, f=1MHz | --- | 445 | --- | pF |
| C _{oss} ^e | Output Capacitance | | --- | 31 | --- | |
| C _{rss} ^e | Reverse Transfer Capacitance | | --- | 15 | --- | |

Diode Characteristics

| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------------------------|---------------------------|---|------|------|------|------|
| I _S | Continuous Source Current | V _G =V _D =0V, Force Current | --- | --- | 15 | A |
| V _{SD} ^d | Diode Forward Voltage | V _{GS} =0V, I _S =5A, T _J =25°C | --- | --- | 1.3 | 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 ($T_J=25^\circ\text{C}$, 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 | $V_{GS}=-10V, I_D=-3A$ | --- | 150 | 180 | m Ω |
| | | $V_{GS}=-4.5V, I_D=-2A$ | --- | 170 | 210 | |
| $V_{GS(th)}$ | Gate Threshold Voltage | $V_{GS}=V_{DS}, I_D=-250\mu A$ | -1.3 | -1.8 | -2.3 | 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 |
| Q_g^e | Total Gate Charge | $V_{DS}=-50V, V_{GS}=-4.5V, I_D=-3A$ | --- | 16 | --- | nC |
| Q_{gs}^e | Gate-Source Charge | | --- | 2.5 | --- | |
| Q_{gd}^e | Gate-Drain Charge | | --- | 3.5 | --- | |
| $T_{d(on)}^e$ | Turn-On Delay Time | $V_{DD}=-30V, V_{GS}=-10V, R_G=6\Omega, I_D=-1A, R_L=15\Omega,$ | --- | 9 | --- | ns |
| T_r^e | Rise Time | | --- | 5 | --- | |
| $T_{d(off)}^e$ | Turn-Off Delay Time | | --- | 50 | --- | |
| T_f^e | Fall Time | | --- | 30 | --- | |
| C_{iss}^e | Input Capacitance | $V_{DS}=-30V, V_{GS}=0V, f=1\text{MHz}$ | --- | 700 | --- | pF |
| C_{oss}^e | Output Capacitance | | --- | 50 | --- | |
| C_{rss}^e | Reverse Transfer Capacitance | | --- | 28 | --- | |

Diode Characteristics

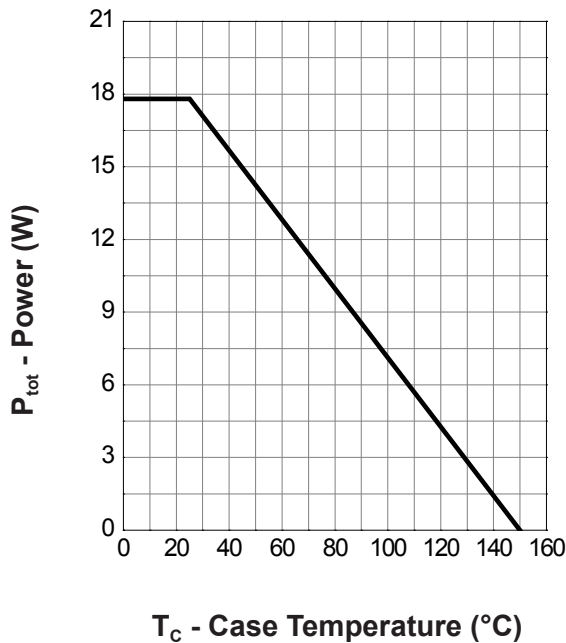
| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Unit |
|------------|---------------------------|--|------|------|------|------|
| I_S | Continuous Source Current | $V_G=V_D=0V$, Force Current | --- | --- | -12 | A |
| V_{SD}^e | Diode Forward Voltage | $V_{GS}=0V, I_S=-3A, T_J=25^\circ\text{C}$ | --- | --- | -1.2 | V |

Note d : Pulse test; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

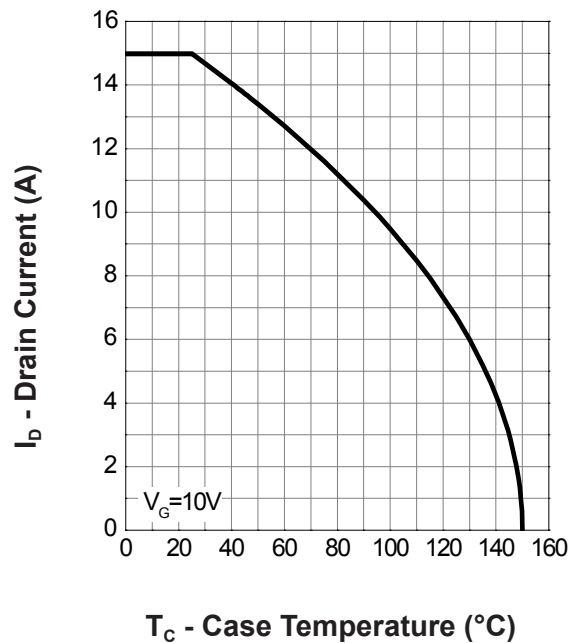
Note e : Guaranteed by design, not subject to production testing.

N-Channel Typical Characteristics

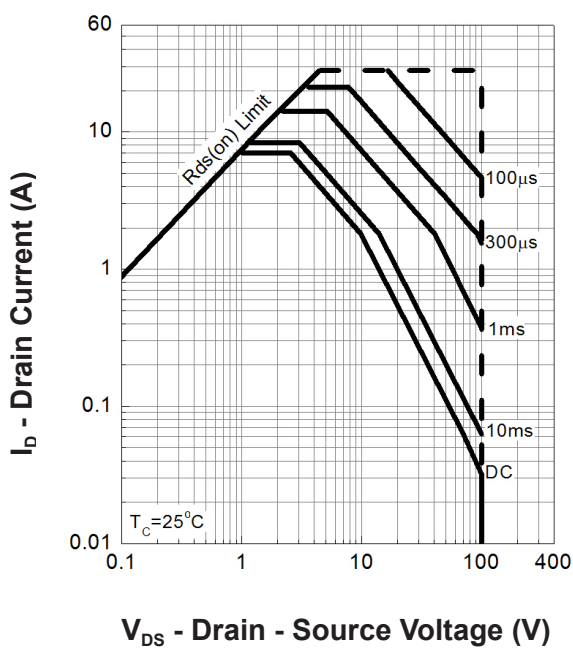
Power Dissipation



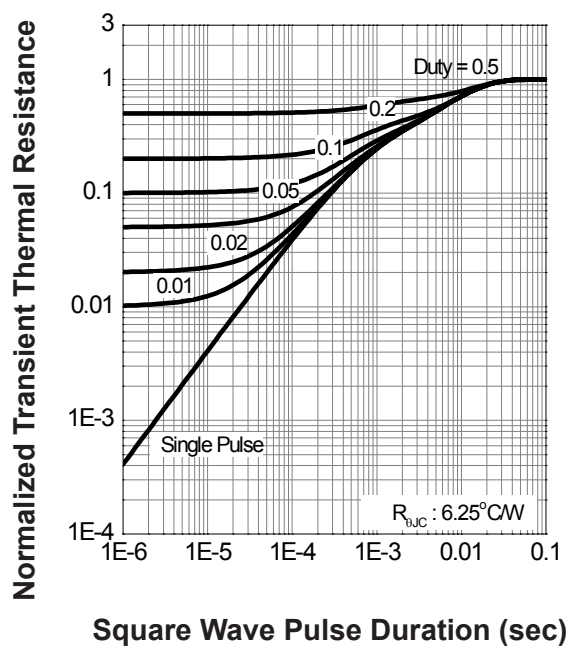
Drain Current



Safe Operation Area

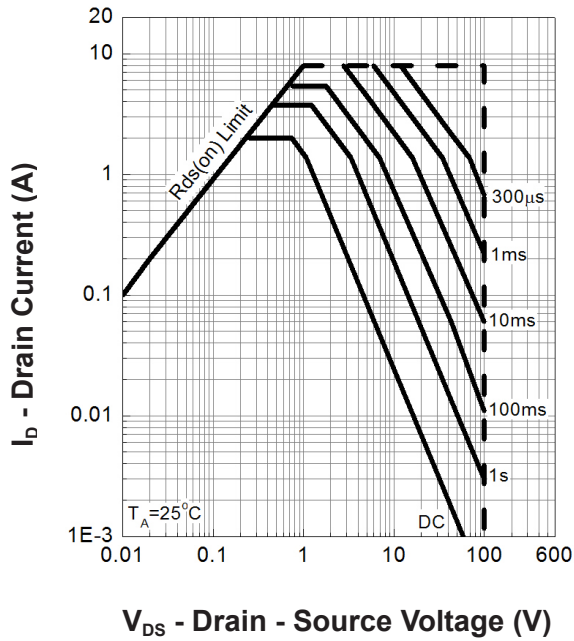


Thermal Transient Impedance

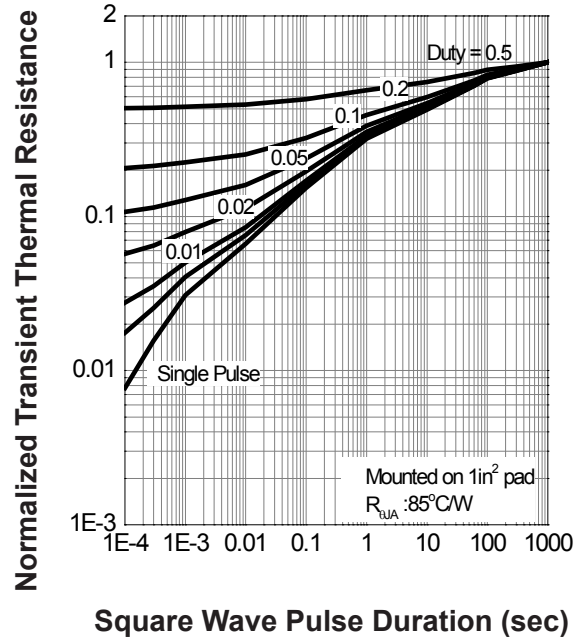


N-Channel Typical Characteristics

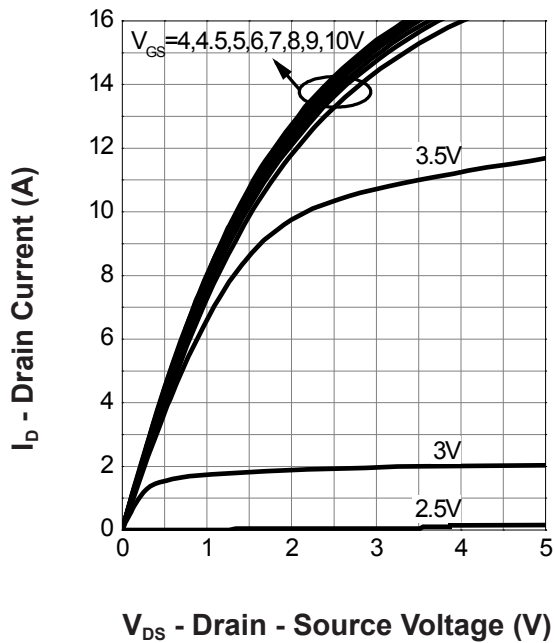
Safe Operation Area



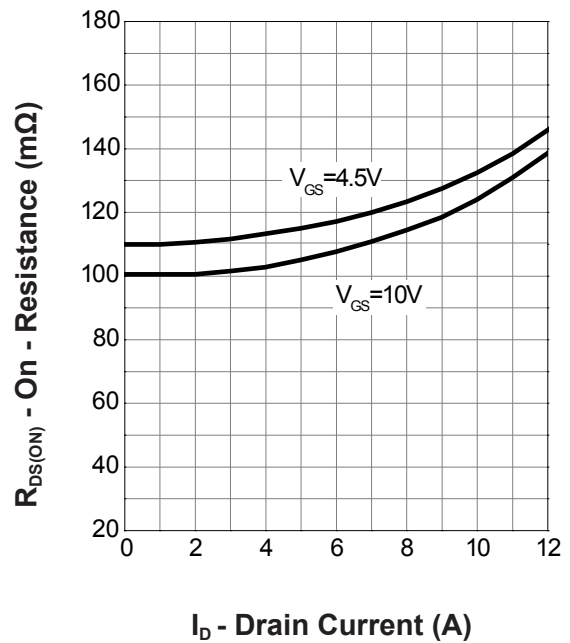
Thermal Transient Impedance



Output Characteristics

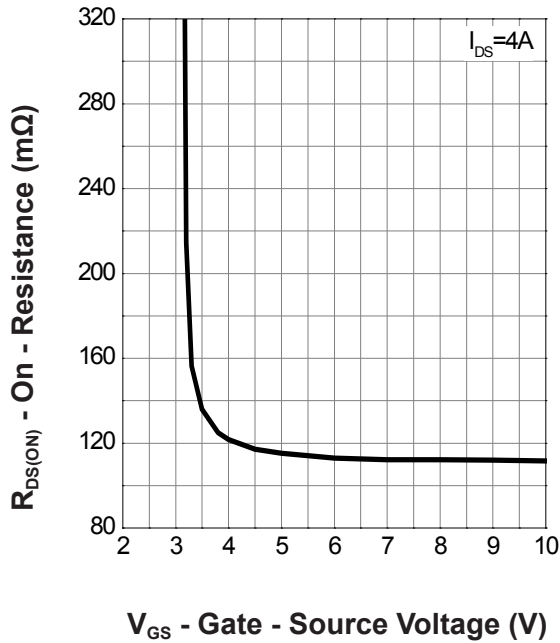


Drain-Source On Resistance

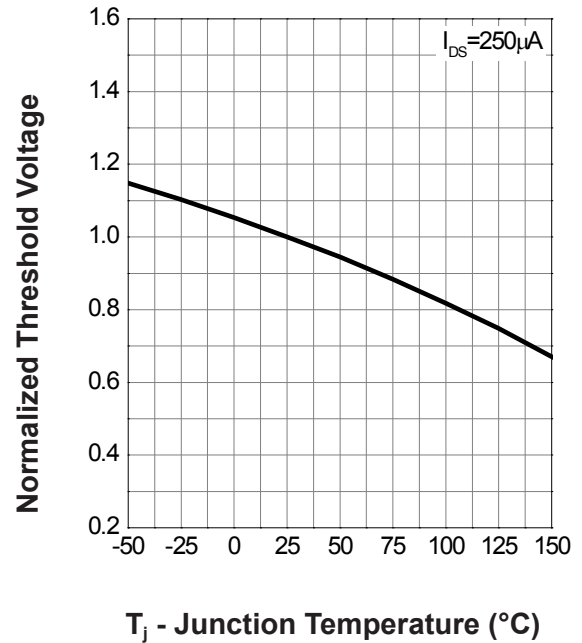


N-Channel Typical Characteristics

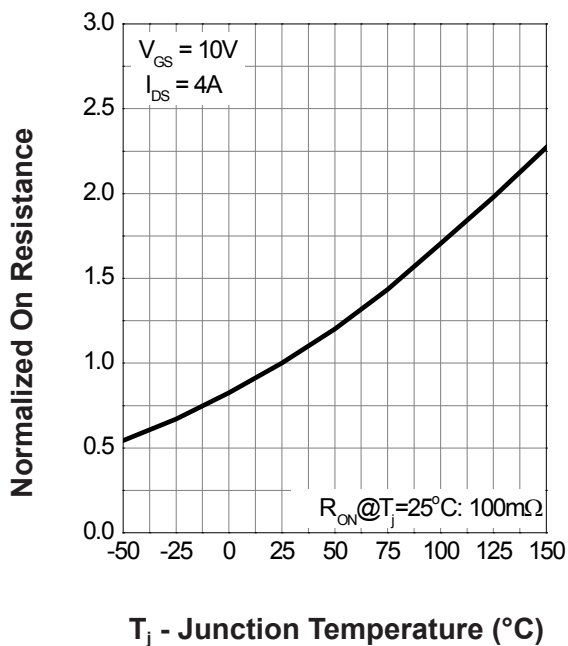
Gate-Source On Resistance



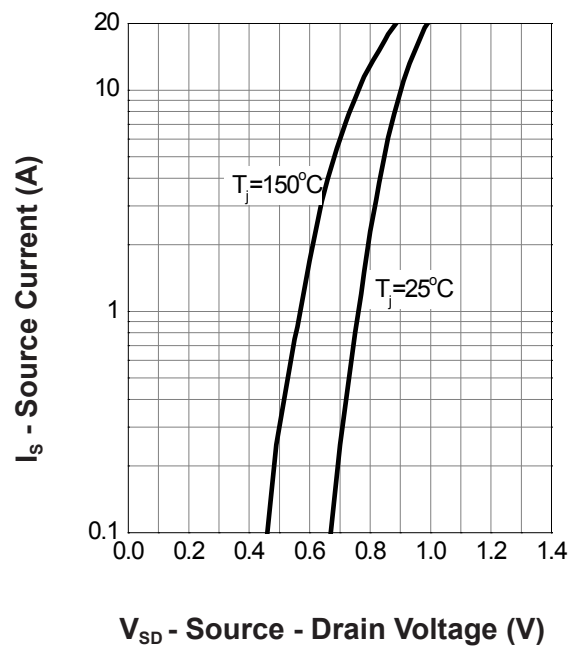
Gate Threshold Voltage



Drain-Source On Resistance

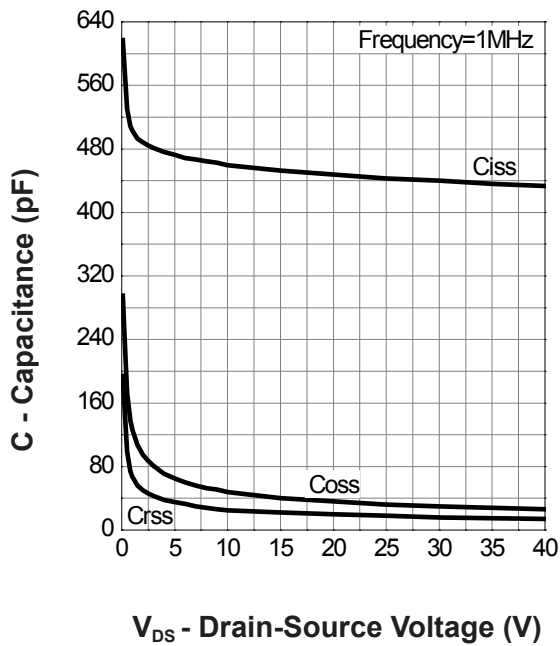


Source-Drain Diode Forward

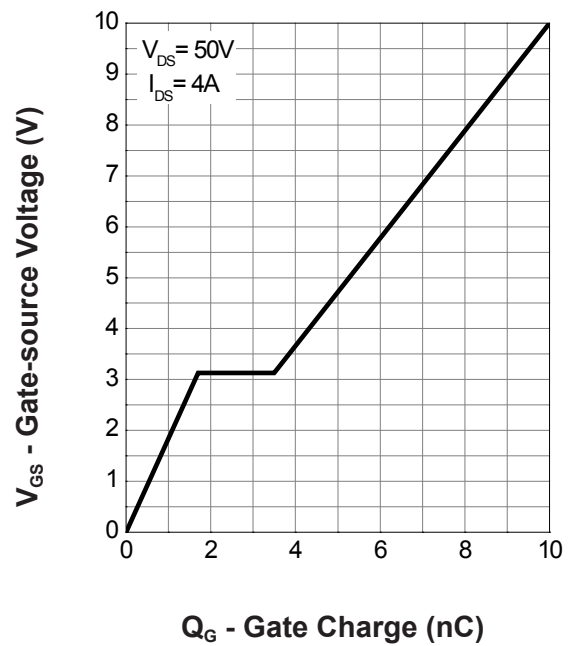


N-Channel Typical Characteristics

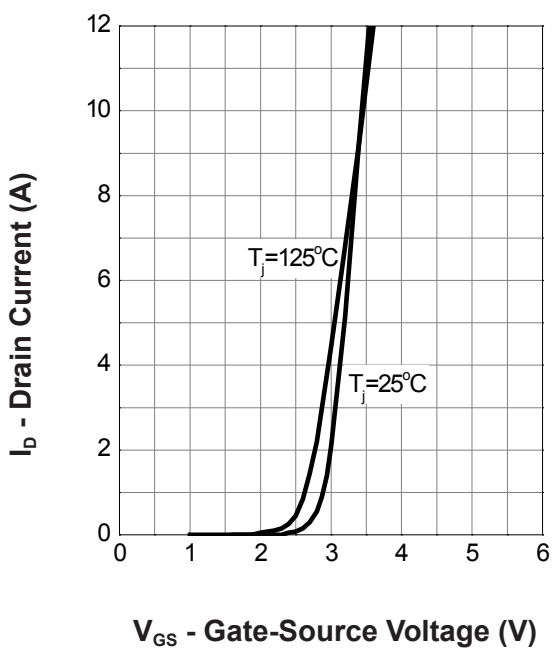
Capacitance



Gate Charge

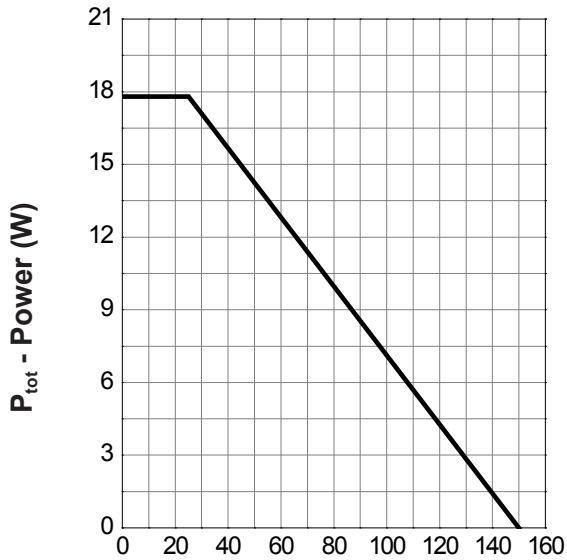


Transfer Characteristics



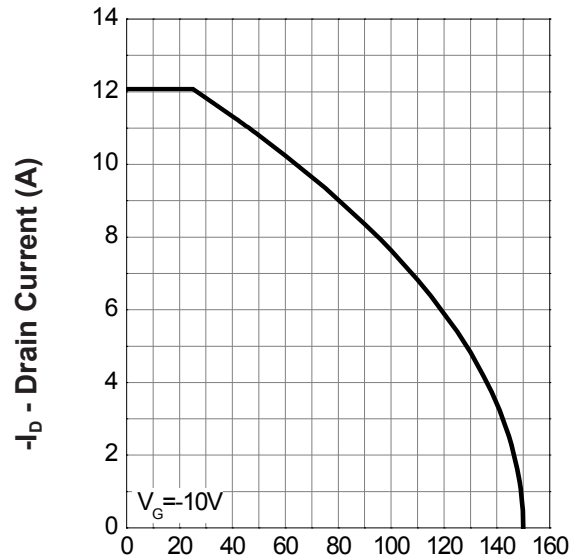
P-Channel Typical Characteristics

Power Dissipation



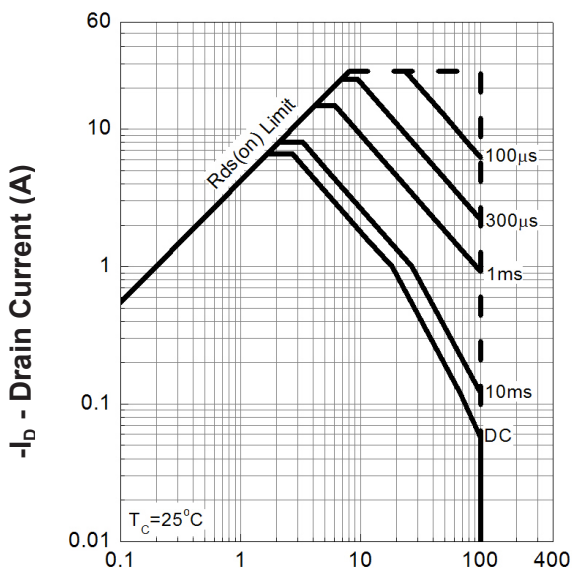
T_c - Case Temperature (°C)

Drain Current



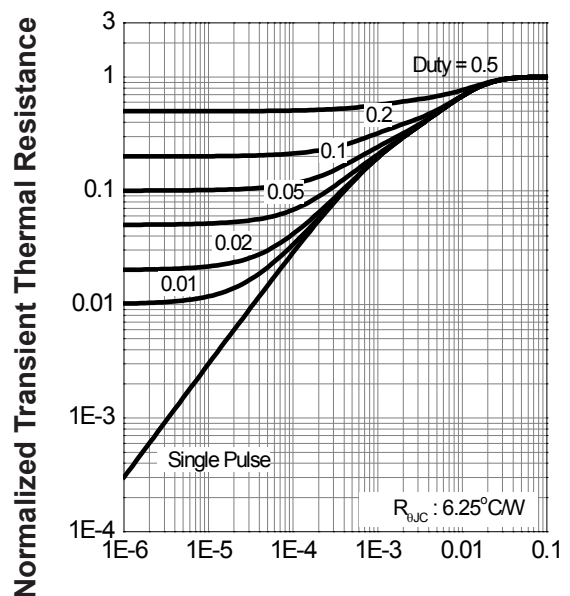
T_c - Case Temperature (°C)

Safe Operation Area



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

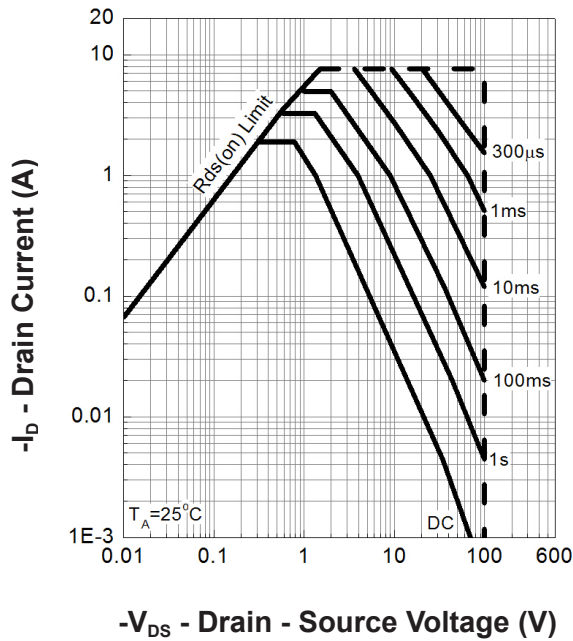
Thermal Transient Impedance



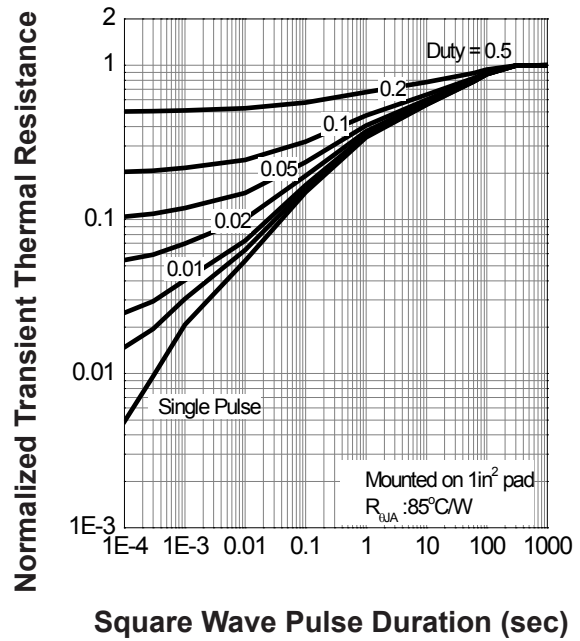
Square Wave Pulse Duration (sec)

P-Channel Typical Characteristics

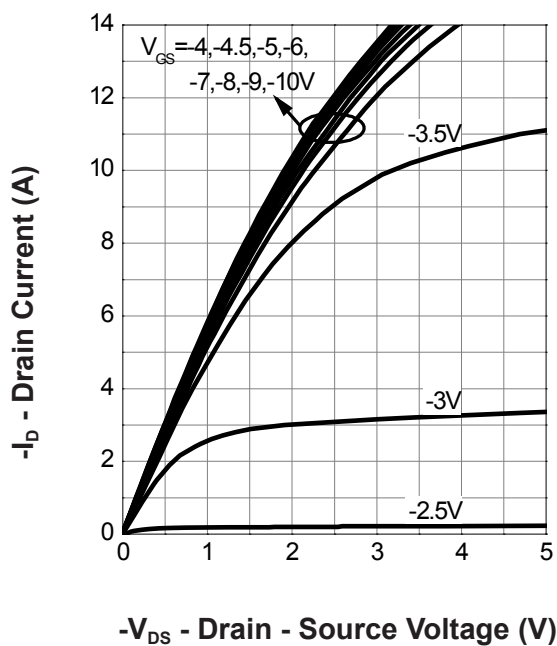
Safe Operation Area



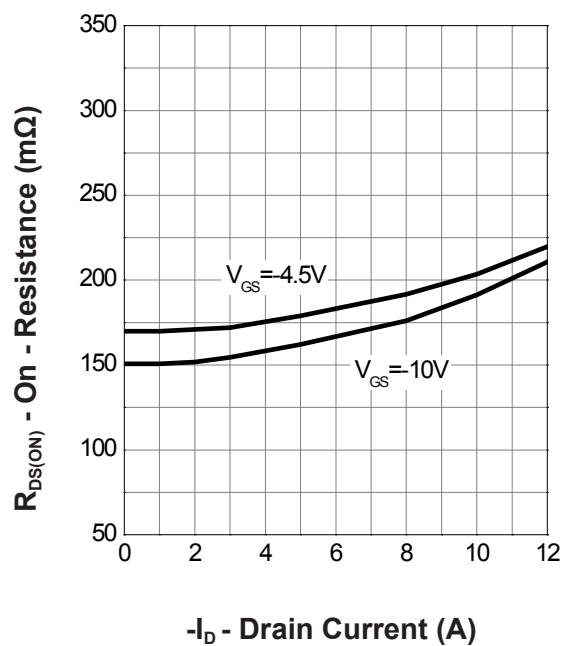
Thermal Transient Impedance



Output Characteristics

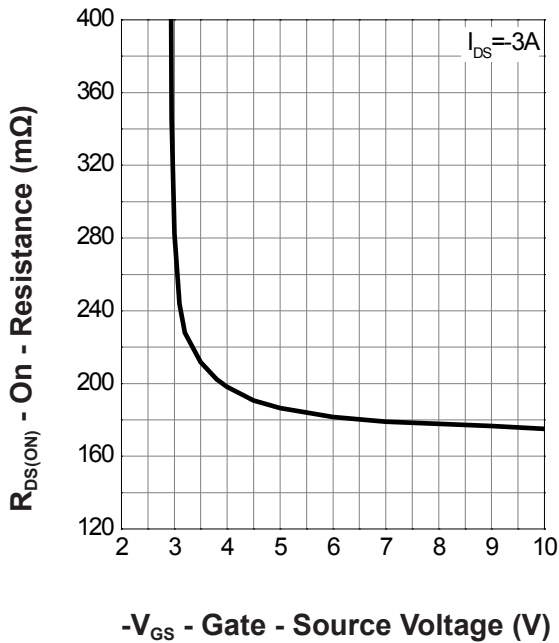


Drain-Source On Resistance

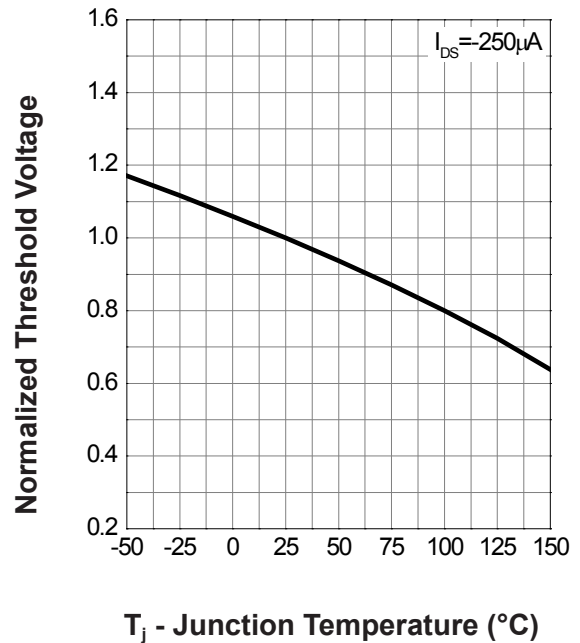


P-Channel Typical Characteristics

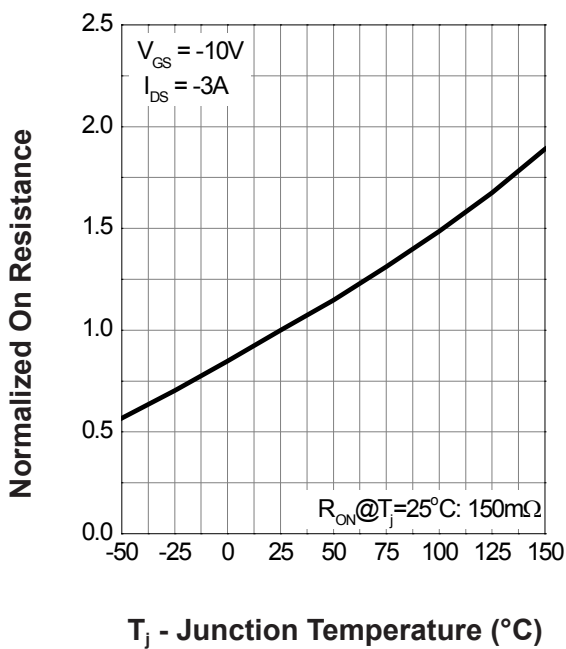
Gate-Source On Resistance



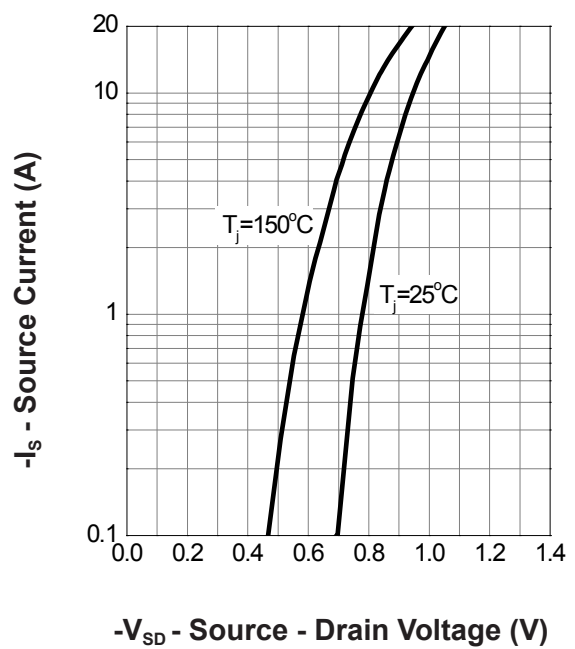
Gate Threshold Voltage



Drain-Source On Resistance

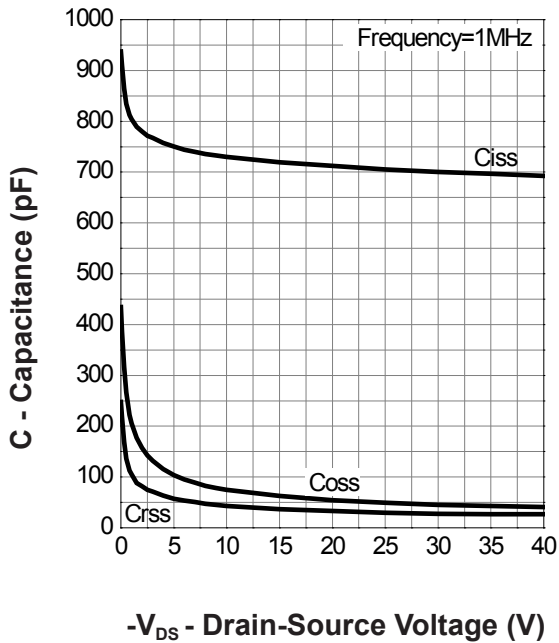


Source-Drain Diode Forward

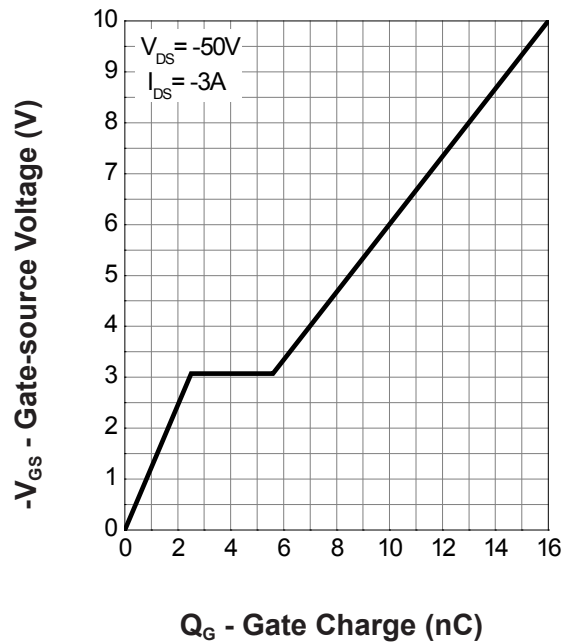


P-Channel Typical Characteristics

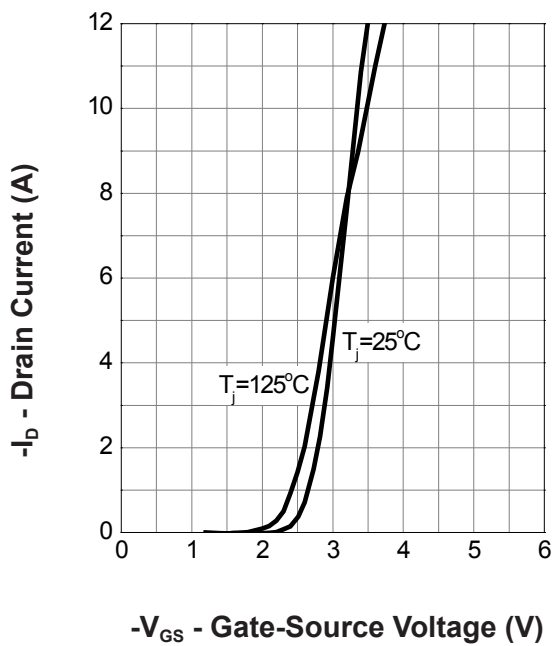
Capacitance



Gate Charge



Transfer Characteristics





Attention

- 1, Any and all Winsok power products described or contained herein do not have specifications that can handle applications that require extremely high levels of reliability, such as life-support systems, aircraft's control systems, or other applications whose failure can be reasonably expected to result in serious physical and/or material damage. Consult with your Winsok power representative nearest you before using any Winsok power products described or contained herein in such applications.
- 2, Winsok power assumes no responsibility for equipment failures that result from using products at values that exceed, even momentarily, rated values (such as maximum ratings, operating condition ranges, or other parameters) listed in products specifications of any and all Winsok power products described or contained herein.
- 3, Specifications of any and all Winsok power products described or contained herein stipulate the performance, characteristics, and functions of the described products in the independent state, and are not guarantees of the performance, characteristics, and functions of the described products as mounted in the customer's products or equipment. To verify symptoms and states that cannot be evaluated in an independent device, the customer should always evaluate and test devices mounted in the customer's products or equipment.
- 4, Winsok power Semiconductor CO., LTD. strives to supply high-quality high-reliability products. However, any and all semiconductor products fail with some probability. It is possible that these probabilistic failures could give rise to accidents or events that could endanger human lives that could give rise to smoke or fire, or that could cause damage to other property. When designing equipment, adopt safety measures so that these kinds of accidents or events cannot occur. Such measures include but are not limited to protective circuits and error prevention circuits for safe design, redundant design, and structural design.
- 5, In the event that any or all Winsok power products (including technical data, services) described or contained herein are controlled under any of applicable local export control laws and regulations, such products must not be exported without obtaining the export license from the authorities concerned in accordance with the above law.
- 6, No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, or any information storage or retrieval system, or otherwise, without the prior written permission of Winsok power Semiconductor CO., LTD.
- 7, Information (including circuit diagrams and circuit parameters) herein is for example only; it is not guaranteed for volume production. Winsok power believes information herein is accurate and reliable, but no guarantees are made or implied regarding its use or any infringements of intellectual property rights or other rights of third parties.
- 8, Any and all information described or contained herein are subject to change without notice due to product/technology improvement, etc. When designing equipment, refer to the "Delivery Specification" for the Winsok power product that you intend to use.
- 9, this catalog provides information as of Sep. 2014. Specifications and information herein are subject to change without notice.