

### General Description

The WSD3045DN is the highest performance trench N-ch and P-ch MOSFETs with extreme high cell density, which provide excellent R<sub>DS(on)</sub> and gate charge for most of the synchronous buck converter applications.

The WSD3045DN meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

### Applications

Synchronous Rectification.

Motor Control.

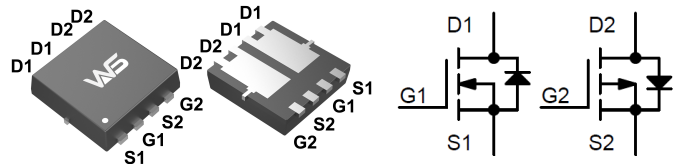
High Current, High Speed Switching.

Portable equipment application.

### Product Summary

BVDSS	R <sub>DS(on)</sub>	I <sub>D</sub>
30V	10.5mΩ	18A
-30V	24mΩ	-15.3A

### DFN3.3x3.3-8-EP Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Channel	P-Channel	
V <sub>DS</sub>	Drain-Source Voltage	30	-30	V
V <sub>GS</sub>	Gate-Source Voltage	±20	±20	V
I <sub>D</sub> @T <sub>C</sub> =25°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	18	-15.3	A
I <sub>D</sub> @T <sub>C</sub> =100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V <sup>1</sup>	7	-8.4	A
I <sub>DM</sub>	Pulsed Drain Current <sup>2</sup>	44	-53	A
EAS	Single Pulse Avalanche Energy <sup>3</sup>	7.3	20	mJ
I <sub>AS</sub>	Avalanche Current	5.4	-9	A
P <sub>D</sub> @T <sub>C</sub> =25°C	Total Power Dissipation <sup>4</sup>	2.1	2.1	W
T <sub>STG</sub>	Storage Temperature Range	-55 to 150	-55 to 150	°C
T <sub>J</sub>	Operating Junction Temperature Range	-55 to 150	-55 to 150	°C

### Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
R <sub>θJA</sub>	Thermal Resistance Junction-Ambient <sup>1</sup>	---	85	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	---	50	°C/W

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BVDSS Temperature Coefficient	Reference to 25 °C, I <sub>D</sub> =1mA	---	0.034	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =6A	---	8.5	10.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A	---	10	14	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.3	1.8	2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	-5.8	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =25 °C	---	---	1	uA
		V <sub>DS</sub> =30V, V <sub>GS</sub> =0V, T <sub>J</sub> =55 °C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =15V, I <sub>D</sub> =5A	---	10	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =24V, V <sub>GS</sub> =0V, f=1MHz	---	2.5	---	Ω
Q <sub>g</sub>	Total Gate Charge (4.5V)	V <sub>DS</sub> =20V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A	---	2.7	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	1.3	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	1.7	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =12V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω I <sub>D</sub> =5A	---	5	---	ns
T <sub>r</sub>	Rise Time		---	11	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	11.5	---	
T <sub>f</sub>	Fall Time		---	2.6	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=1MHz	---	250	---	pF
C <sub>oss</sub>	Output Capacitance		---	40	---	
C <sub>riss</sub>	Reverse Transfer Capacitance		---	30	---	

**Guaranteed Avalanche Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy <sup>5</sup>	V <sub>DD</sub> =25V, L=0.5mH, I <sub>AS</sub> =10A	5	---	---	mJ

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	6	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	15	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =5A, T <sub>J</sub> =25 °C	---	---	1.2	V

Note :

- The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 20Z copper, t<10sec.
- The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
- The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=25V, V<sub>GS</sub>=10V, L=0.5mH, I<sub>AS</sub>=10A
- The power dissipation is limited by 150 °C junction temperature
- The Min. value is 100% EAS tested guarantee.
- The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

**Electrical Characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-30	---	---	V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.085	---	V/°C
R <sub>DS(ON)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-6A	---	20	24	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-3A	---	30	38	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-1.0	-1.8	-2.5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	0.375	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-6A	---	6	---	S
Q <sub>g</sub>	Total Gate Charge (-4.5V)	V <sub>DS</sub> =-20V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-6A	---	6	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	2	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	3	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-12V, V <sub>GS</sub> =-10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =-5A	---	8.7	---	ns
T <sub>r</sub>	Rise Time		---	10	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	22	---	
T <sub>f</sub>	Fall Time		---	9	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-25V, V <sub>GS</sub> =0V, f=1MHz	---	880	---	pF
C <sub>oss</sub>	Output Capacitance		---	145	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	92	---	

**Guaranteed Avalanche Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
EAS	Single Pulse Avalanche Energy <sup>5</sup>	V <sub>DD</sub> =-25V, L=0.5mH, I <sub>AS</sub> =-10A	16	---	---	mJ

**Diode Characteristics**

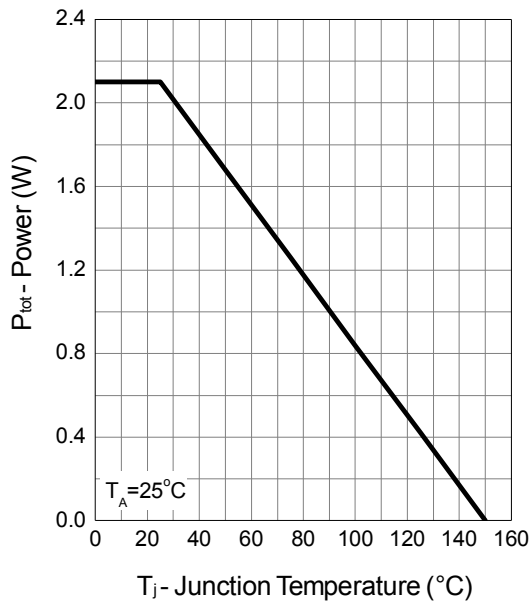
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current <sup>1,6</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-6.6	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,6</sup>		---	---	-15.5	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>S</sub> =-6A, T <sub>J</sub> =25°C	---	---	-1.2	V

Note :

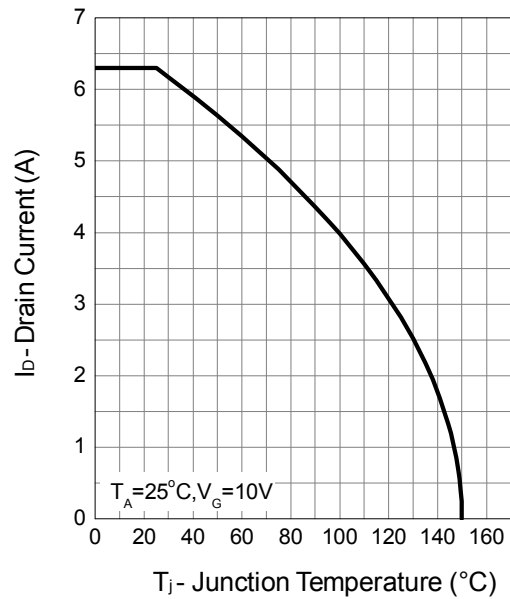
1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper, t<10sec.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
3. The EAS data shows Max. rating. The test condition is V<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=0.5mH, I<sub>AS</sub>=-10A
4. The power dissipation is limited by 150°C junction temperature
5. The Min. value is 100% EAS tested guarantee.
6. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation.

**N-Channel Typical Characteristics**

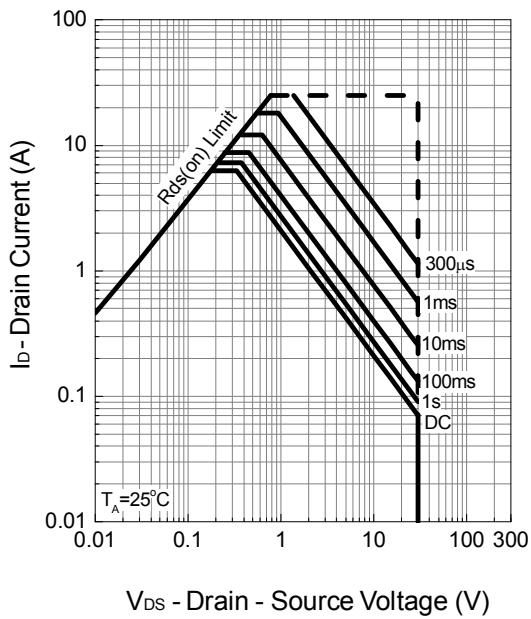
**Power Dissipation**



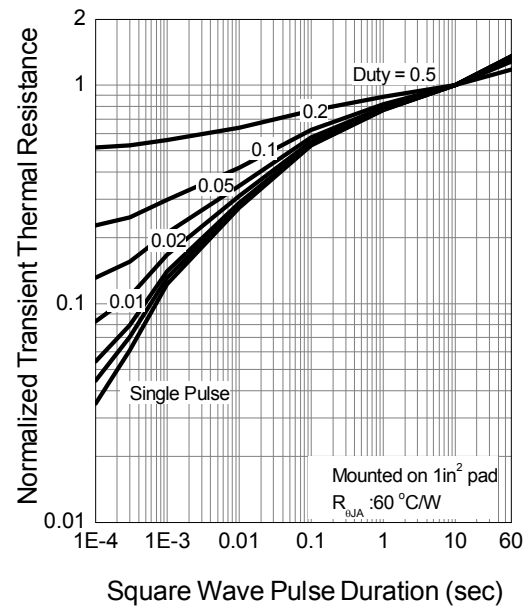
**Drain Current**



**Safe Operation Area**

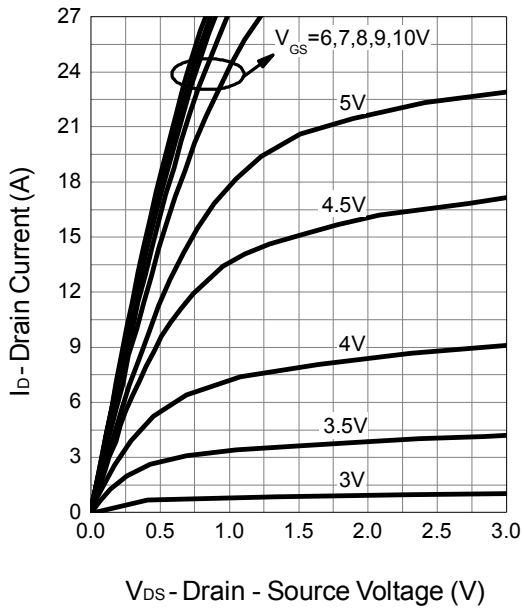


**Thermal Transient Impedance**

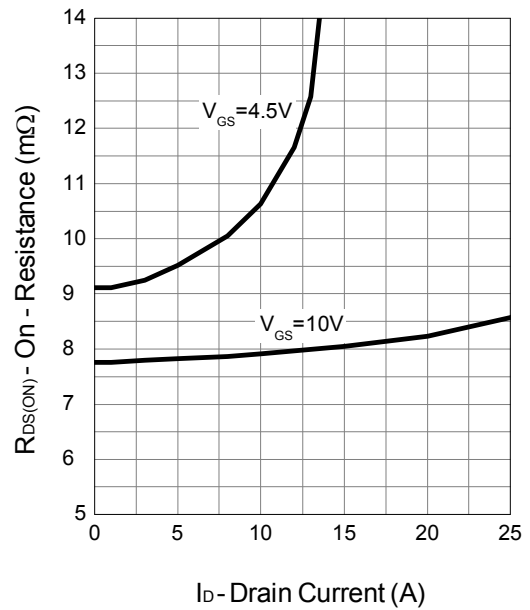


**N-Channel Typical Characteristics**

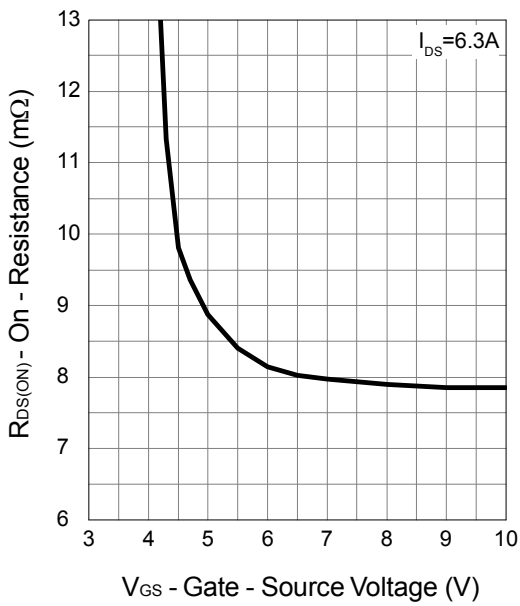
**Output Characteristics**



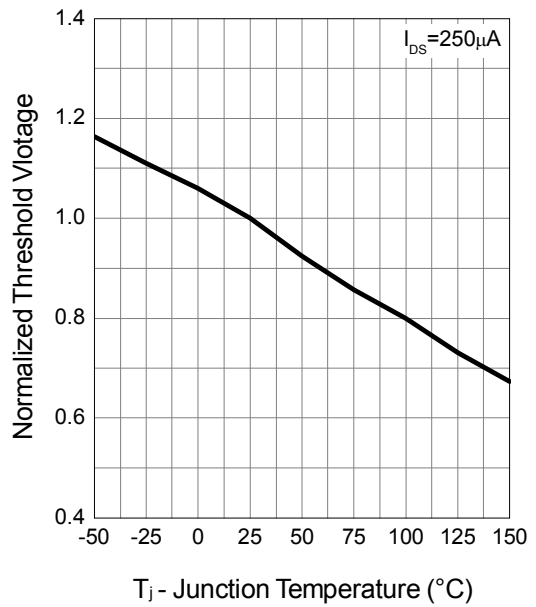
**Drain-Source On Resistance**



**Gate-Source On Resistance**

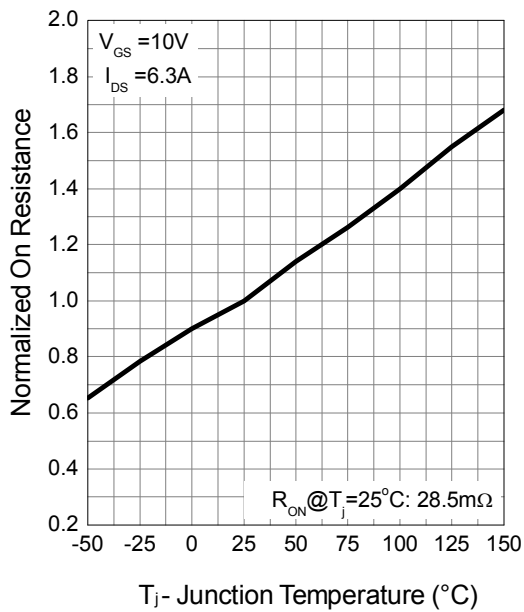


**Gate Threshold Voltage**

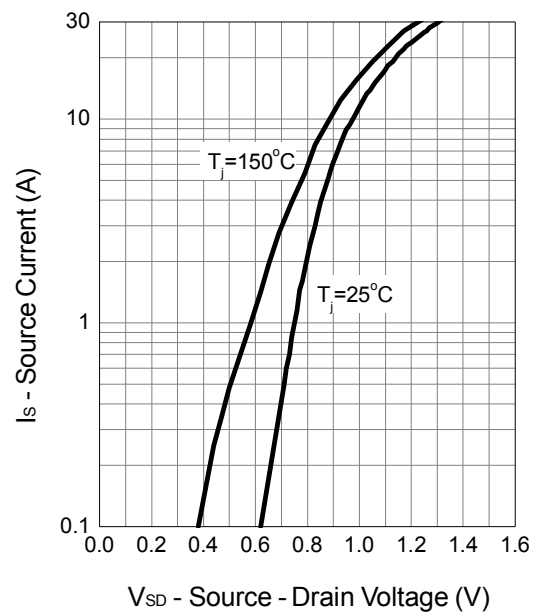


**N-Channel Typical Characteristics**

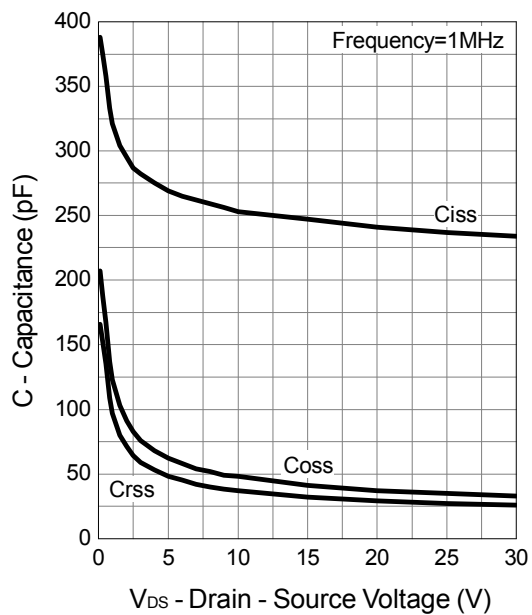
**Drain-Source On Resistance**



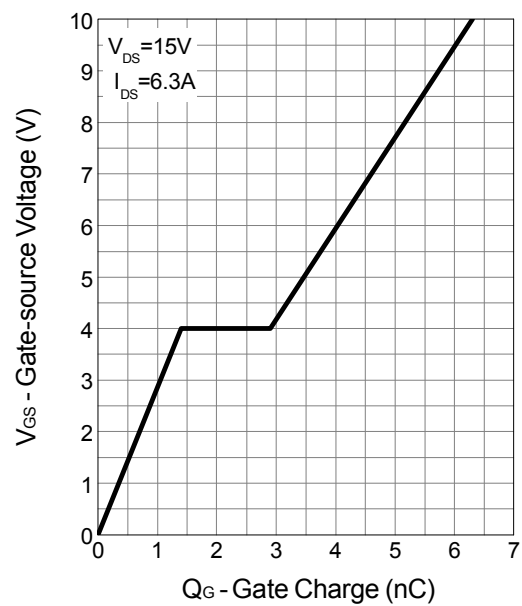
**Source-Drain Diode Forward**



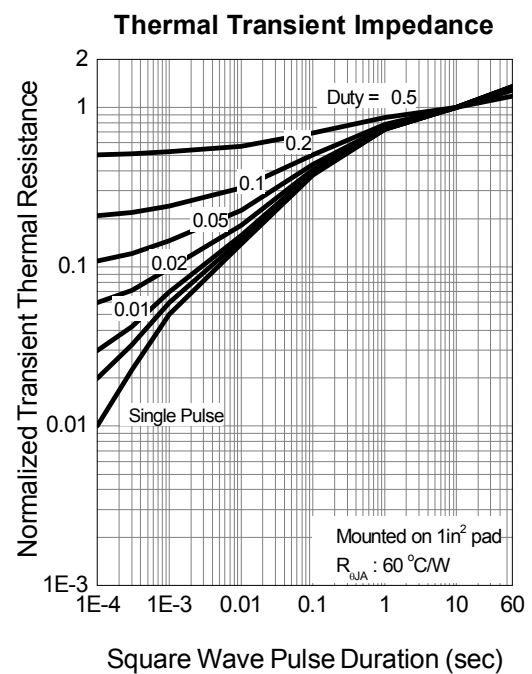
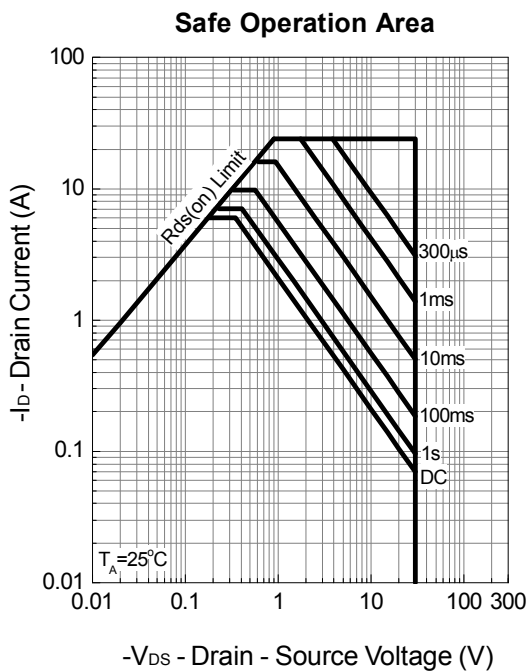
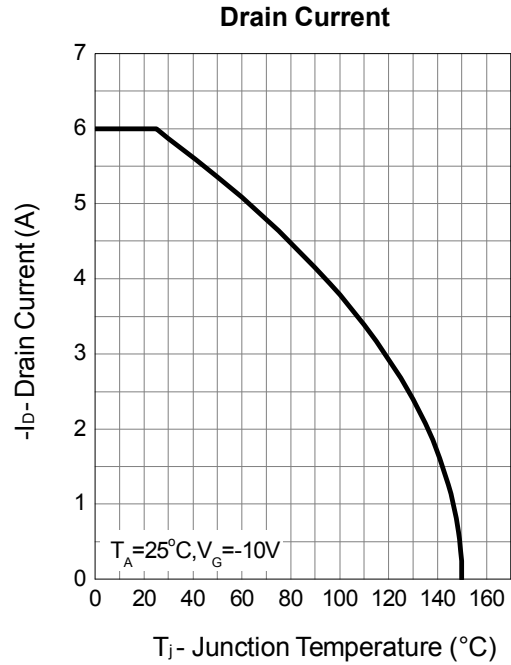
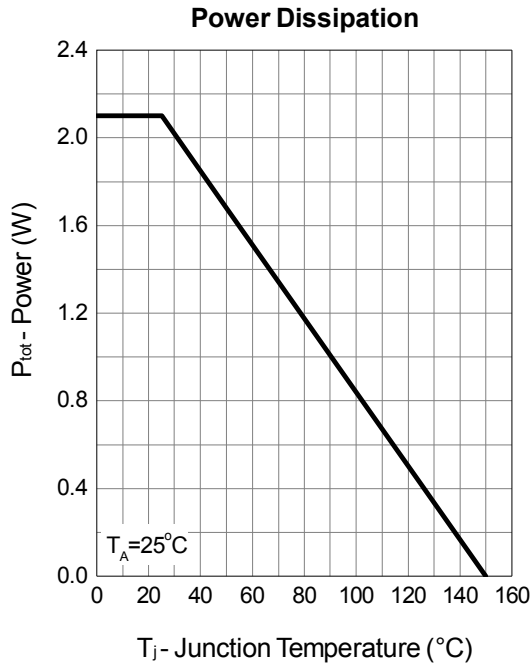
**Capacitance**



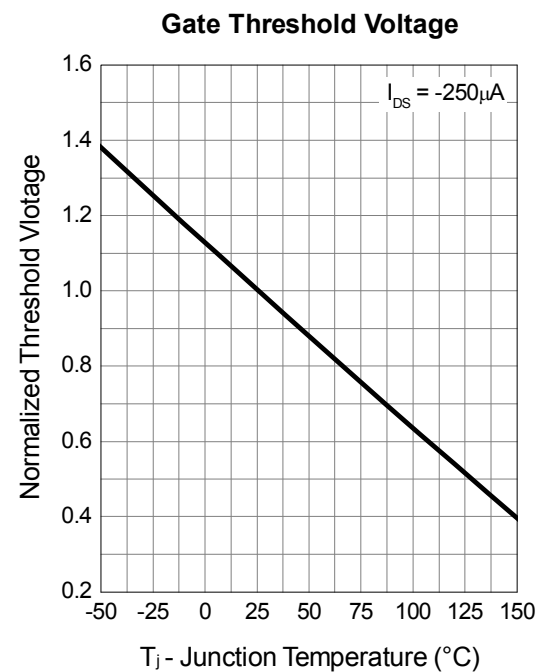
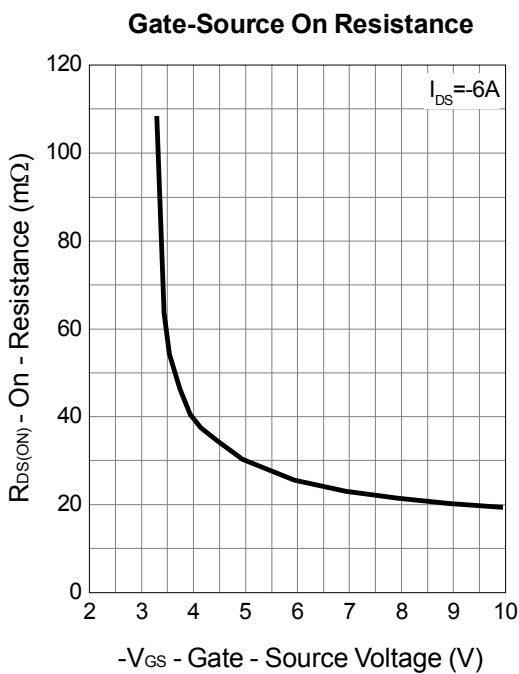
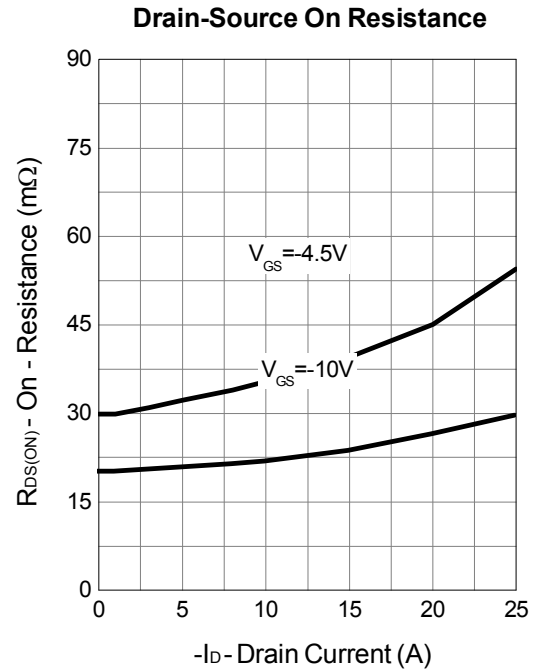
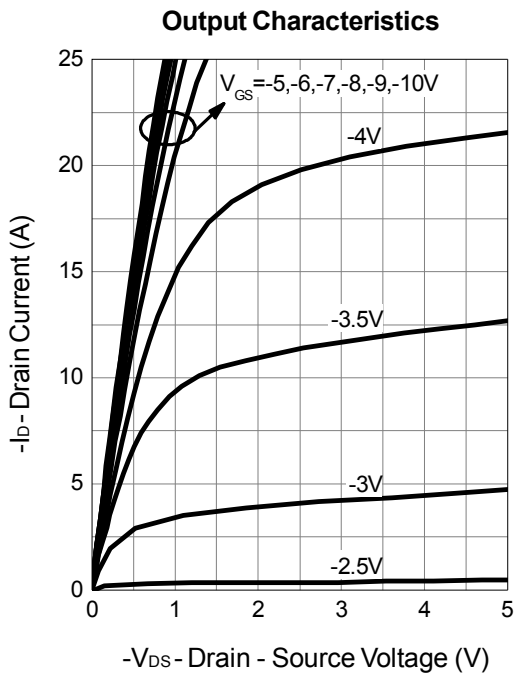
**Gate Charge**



**P-Channel Typical Characteristics**

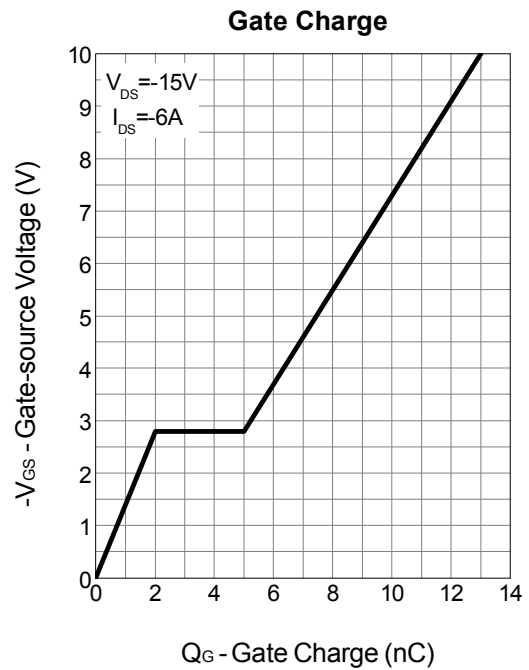
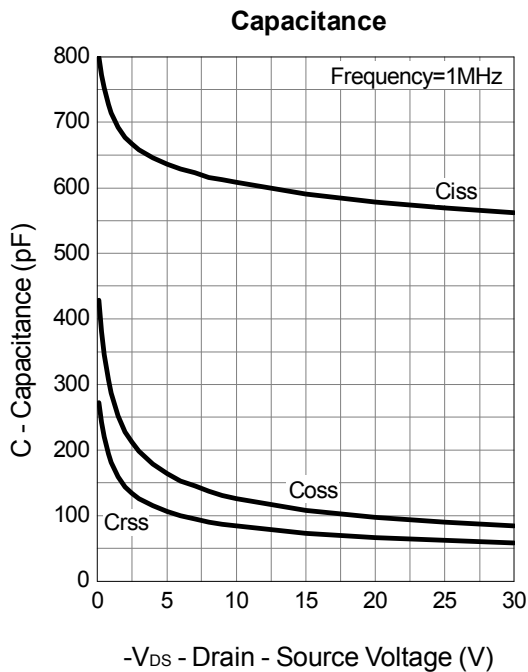
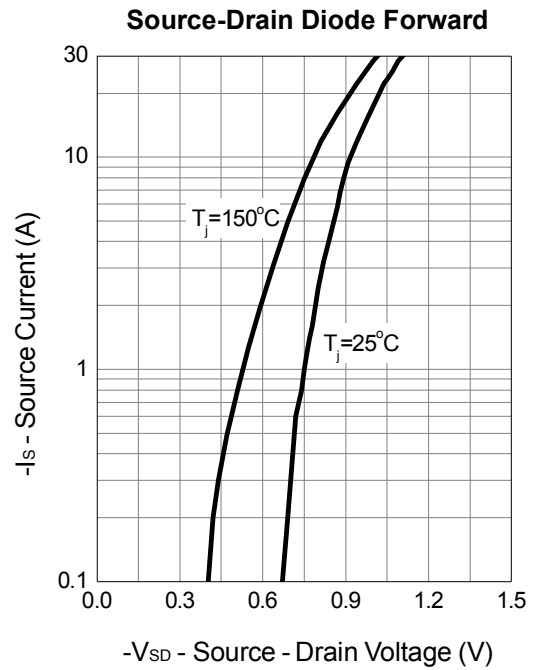
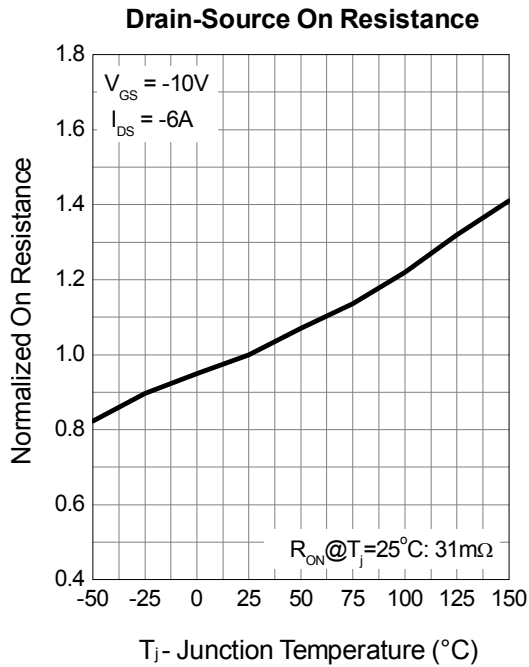


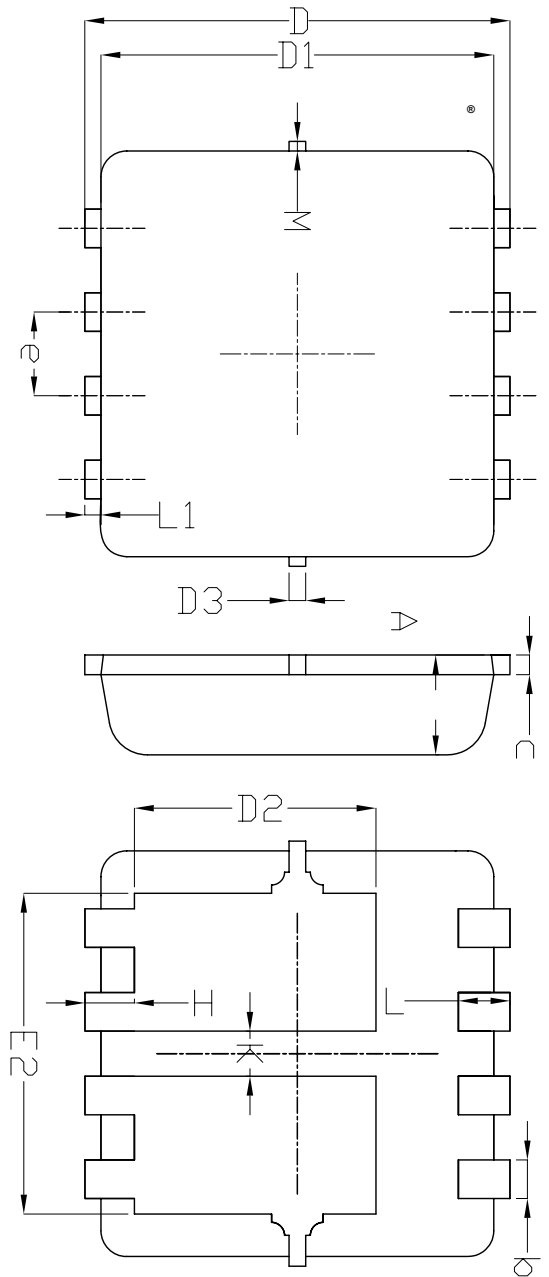
**P-Channel Typical Characteristics**





**P-Channel Typical Characteristics**

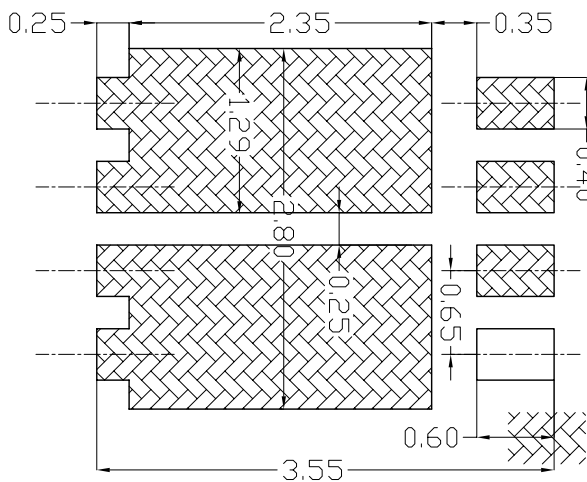




SYMBOL	DIMENSIONAL REQOMTS		
	MIN	NOM	MAX
A	0.70	0.75	0.80
b	0.25	0.30	0.35
c	0.10	0.15	0.25
D	3.25	3.35	3.45
D1	3.00	3.10	3.20
D2	1.78	1.88	1.98
D3	---	0.13	---
E	3.20	3.30	3.40
E1	3.00	3.15	3.20
E2	2.39	2.49	2.59
e	0.65BSC		
H	0.30	0.39	0.50
L	0.30	0.40	0.50
L1	---	0.13	---
K	0.30	---	---
$\theta$	---	10°	12°
M	*	*	0.15

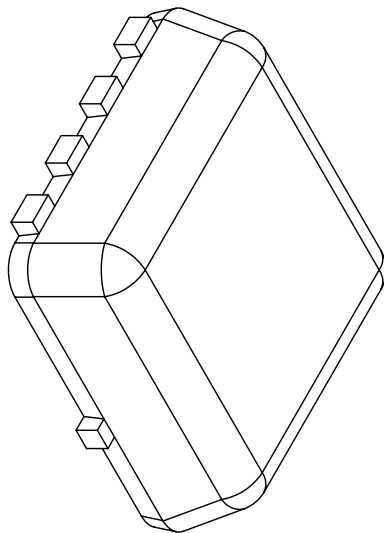
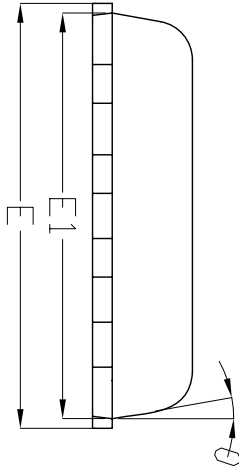
**Land Pattern**

(Only for Reference)



Note:

1. All Dimension Are In mm.
2. Package Body Sizes Exclude Mold Flash, Protrusion Or Gate Burrs.
3. Package Body Sizes Determined At The Outermost Extremes Of The Plastic Body Exclusive Of Mold Flash, Tie Bar Burrs, Gate Burrs And Interlead Flash, But Including Any Mismatch Between The Top And Bottom Of The Plastic Body.





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