

### General Description

The WSD3067DN56 is the highest performance trench N-ch and P-ch MOSFET with extreme high cell density, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The WSD3067 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

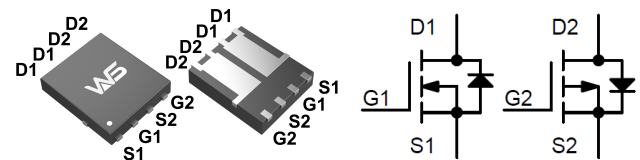
### Product Summary

BVDSS	RDSON	ID
30V	15mΩ	24A
-30V	11mΩ	-19.8A

### Applications

- Synchronous Rectification.
- Motor Control.
- High Current, High Speed Switching.
- Portable equipment application.

### DFN5X6C-8 Pin Configuration



### Absolute Maximum Ratings

Symbol	Parameter	Rating		Units
		N-Ch	P-Ch	
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	24	-19.8	A
I <sub>D</sub> @T <sub>C</sub> =100°C	Continuous Drain Current, V <sub>GS</sub> @ 10V	15	-12.6	A
I <sub>DM</sub> @T <sub>A</sub> =25°C	Pulsed Drain Current	36	-30.4	A
EAS <sup>a</sup>	Single Pulse Avalanche Energy (L=0.1mH)	8.5	18	mJ
I <sub>AS</sub>	Avalanche Current	13	-19	A
P <sub>D</sub> @T <sub>C</sub> =25°C	Total Power Dissipation	18.9	18.9	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>	---	95	°C/W
R <sub>θJC</sub>	Thermal Resistance Junction-Case <sup>1</sup>	---	45	°C/W

Note a : Pulse width limited by max. junction temperature.

Note b : Surface mounted on 1in<sup>2</sup> pad area.

Note c : UIS tested and pulse width limited by maximum junction temperature 150°C (initial temperature T<sub>J</sub>=25°C)

**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> <sup>d</sup>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =10V, I <sub>D</sub> =8A	---	15	20	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A	---	18	23	
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		---	-5.64	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =20V, 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
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	3.3	4.2	Ω
Q <sub>g</sub> <sup>e</sup>	Total Gate Charge	V <sub>DS</sub> =20V, V <sub>GS</sub> =4.5V, I <sub>D</sub> =8A	---	8.3	---	nC
Q <sub>gs</sub> <sup>e</sup>	Gate-Source Charge		---	1.1	---	
Q <sub>gd</sub> <sup>e</sup>	Gate-Drain Charge		---	1.8	---	
T <sub>d(on)</sub> <sup>e</sup>	Turn-On Delay Time	V <sub>DD</sub> =12V, V <sub>GS</sub> =10V, R <sub>G</sub> =3.3Ω I <sub>D</sub> =6A	---	5.5	---	ns
T <sub>r</sub> <sup>e</sup>	Rise Time		---	10.5	---	
T <sub>d(off)</sub> <sup>e</sup>	Turn-Off Delay Time		---	15	---	
T <sub>f</sub> <sup>e</sup>	Fall Time		---	3.7	---	
C <sub>iss</sub> <sup>e</sup>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1MHz	---	395	---	pF
C <sub>oss</sub> <sup>e</sup>	Output Capacitance		---	105	---	
C <sub>riss</sub> <sup>e</sup>	Reverse Transfer Capacitance		---	42	---	

**Diode Characteristics**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	3.0	A
V <sub>SD</sub> <sup>d</sup>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =1A, T <sub>J</sub> =25°C	---	---	1.0	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>F</sub> =4A, dI/dt=100A/μs, T <sub>J</sub> =25°C	---	11	---	nS
Q <sub>rr</sub>	Reverse Recovery Charge		---	3.5	---	nC

Note d : Pulse test ; pulse width≤300μs, duty cycle≤2%.

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

**P-Channel Electrical Characteristics ( $T_J=25\text{ }^\circ\text{C}$ , unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-30	---	---	V
$\Delta BV_{DSS}/\Delta T_J$	BVDSS Temperature Coefficient	Reference to $25^\circ\text{C}$ , $I_D=-1\text{mA}$	---	-0.022	---	$V/^\circ\text{C}$
$R_{DS(ON)}^d$	Static Drain-Source On-Resistance <sup>2</sup>	$V_{GS}=-10V, I_D=-6A$	---	11	14	m $\Omega$
		$V_{GS}=-4.5V, I_D=-4A$	---	15	20	
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=-250\mu A$	-1.3	-1.8	-2.5	V
$\Delta V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	4.6	---	$\text{mV}/^\circ\text{C}$
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-24V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	-1	$\mu\text{A}$
		$V_{DS}=-24V, V_{GS}=0V, T_J=55^\circ\text{C}$	---	---	-5	
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$	---	---	$\pm 100$	nA
$R_g^e$	Gate Resistance	$V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$	---	12	---	$\Omega$
$Q_g^e$	Total Gate Charge (-4.5V)	$V_{DS}=-15V, V_{GS}=-4.5V, I_D=-6A$	---	8	---	nC
$Q_{gs}^e$	Gate-Source Charge		---	2	---	
$Q_{gd}^e$	Gate-Drain Charge		---	4	---	
$T_{d(on)}^e$	Turn-On Delay Time	$V_{DD}=-15V, V_{GS}=-10V, R_G=3.3\Omega, I_D=-6A$	---	9	---	ns
$T_r^e$	Rise Time		---	11	---	
$T_{d(off)}^e$	Turn-Off Delay Time		---	55	---	
$T_f^e$	Fall Time		---	34	---	
$C_{iss}^e$	Input Capacitance	$V_{DS}=-15V, V_{GS}=0V, f=1\text{MHz}$	---	750	---	pF
$C_{oss}^e$	Output Capacitance		---	140	---	
$C_{rss}^e$	Reverse Transfer Capacitance		---	102	---	

**Diode Characteristics<sup>e</sup>**

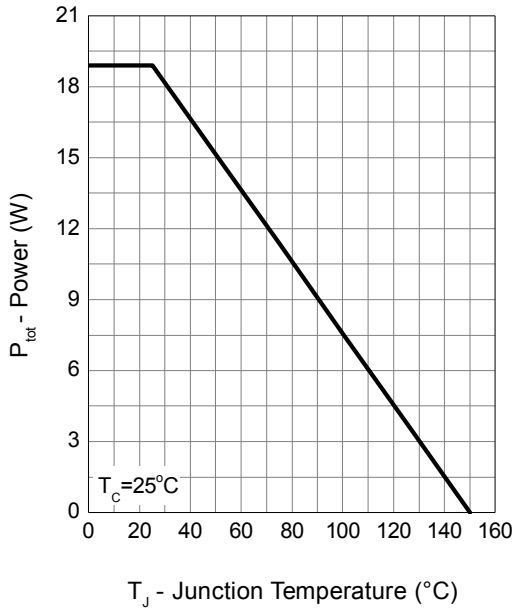
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V$ , Force Current	---	---	-6.5	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=-7A, dI/dt=100A/\mu s, T_J=25^\circ\text{C}$	---	17	---	nS
$Q_{rr}$	Reverse Recovery Charge		---	9	---	nC

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

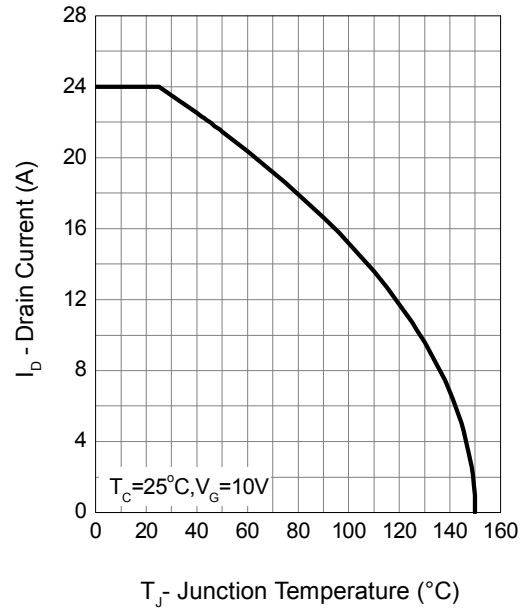
Note e : Guaranteed by design, not subject to production testing.

**N-Channel Typical Characteristics**

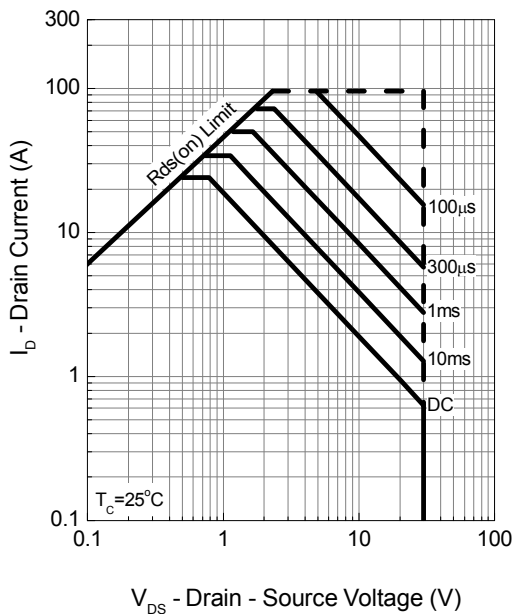
**Power Dissipation**



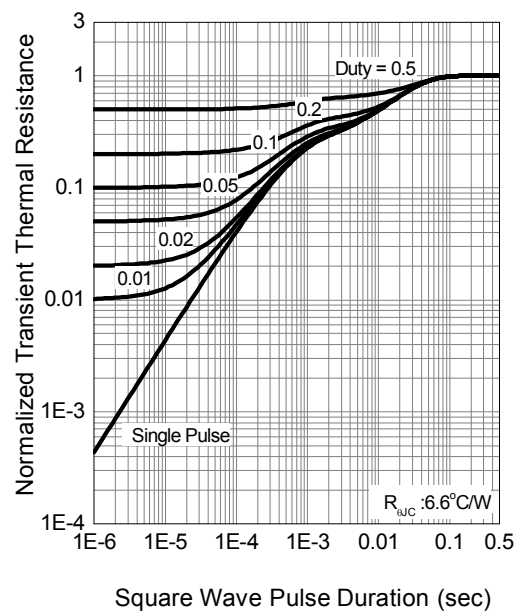
**Drain Current**



**Safe Operation Area**

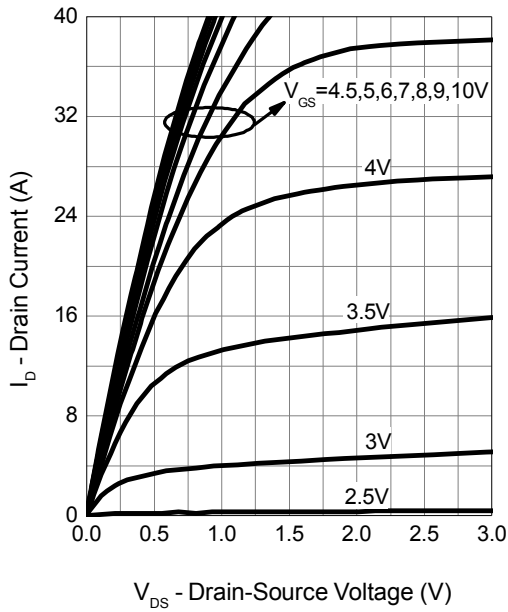


**Thermal Transient Impedance**

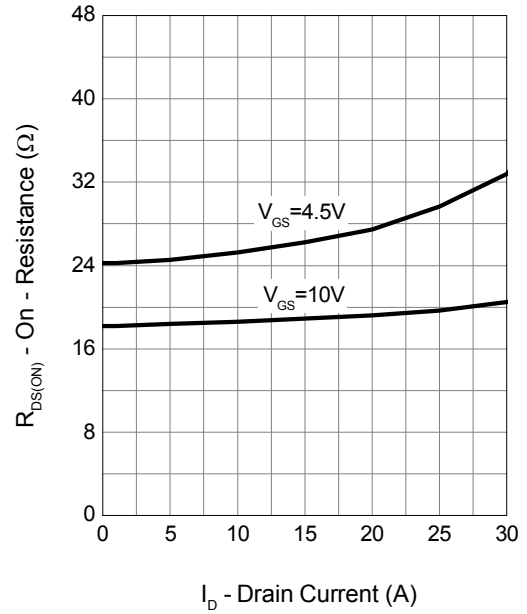


**N-Channel Typical Characteristics**

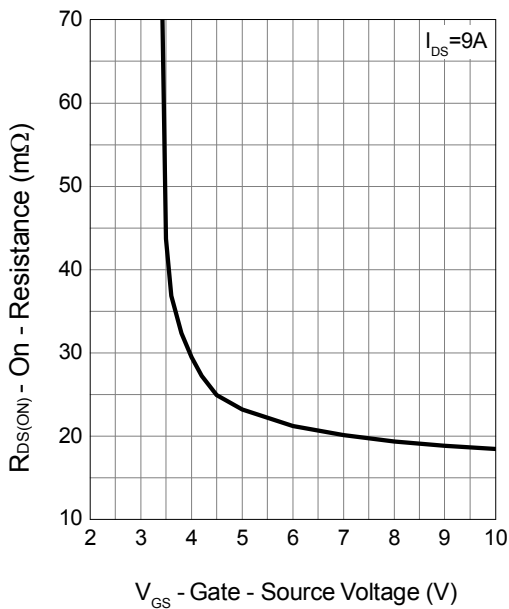
**Output Characteristics**



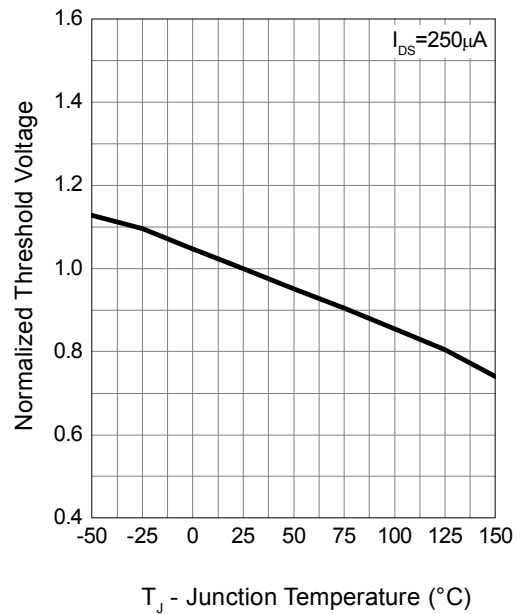
**Drain-Source On Resistance**



**Transfer Characteristics**

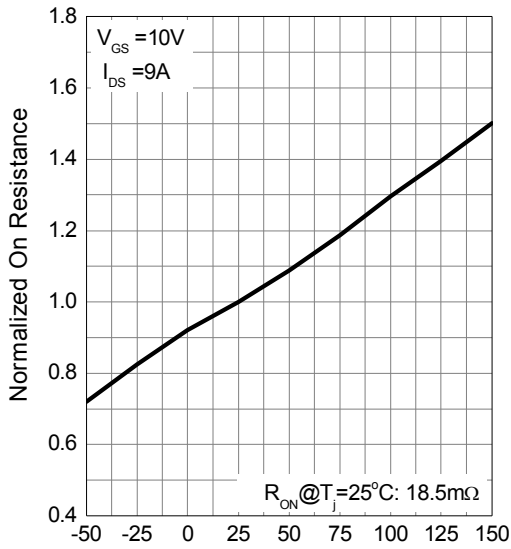


**Gate Threshold Voltage**



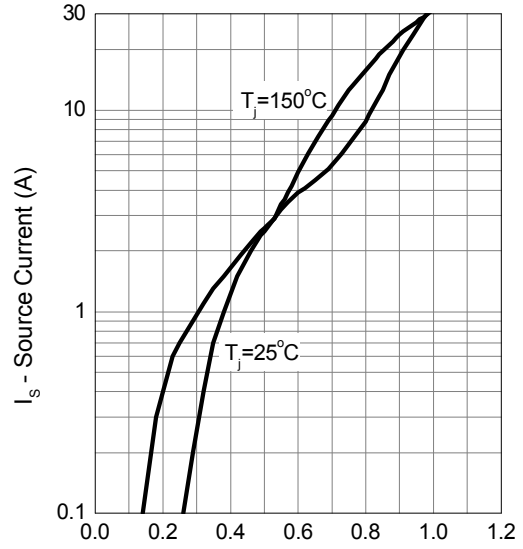
**N-Channel Typical Characteristics**

**Drain-Source On Resistance**



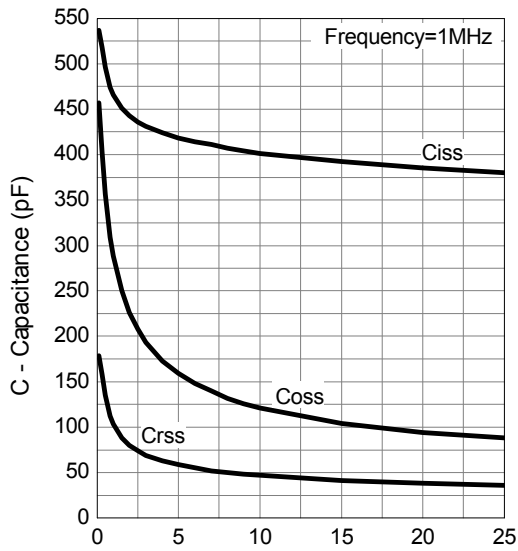
$T_j$  - Junction Temperature (°C)

**Source-Drain Diode Forward**



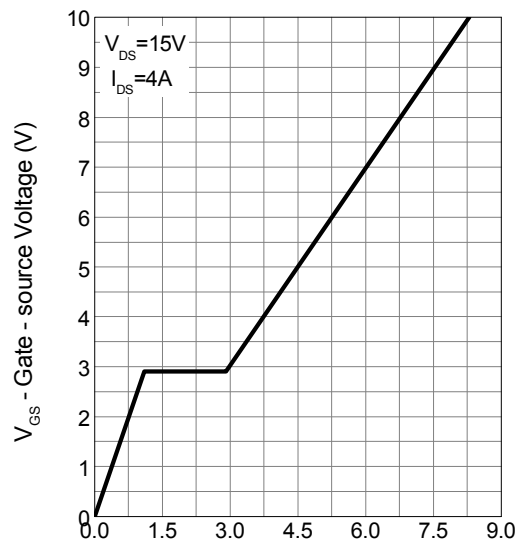
$V_{SD}$  - Source - Drain Voltage (V)

**Capacitance**



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

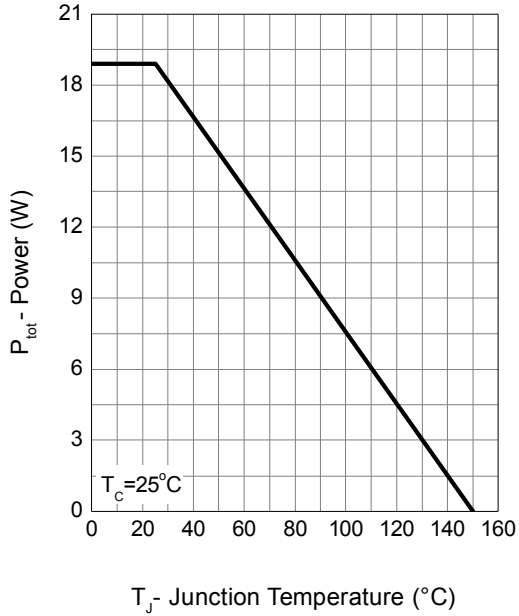
**Gate Charge**



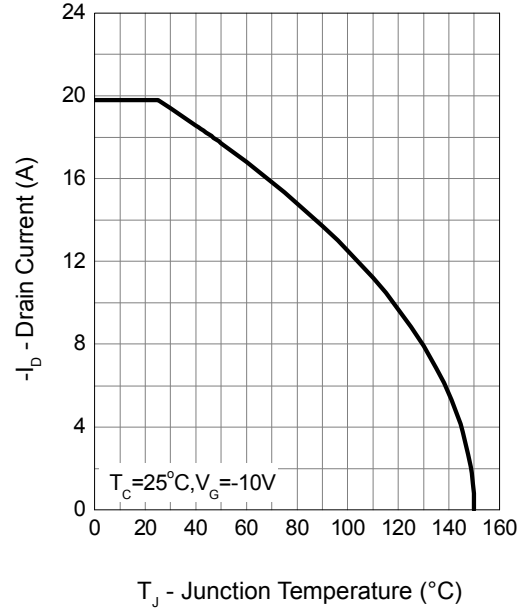
$Q_g$  - Gate Charge (nC)

**N-Channel Typical Characteristics**

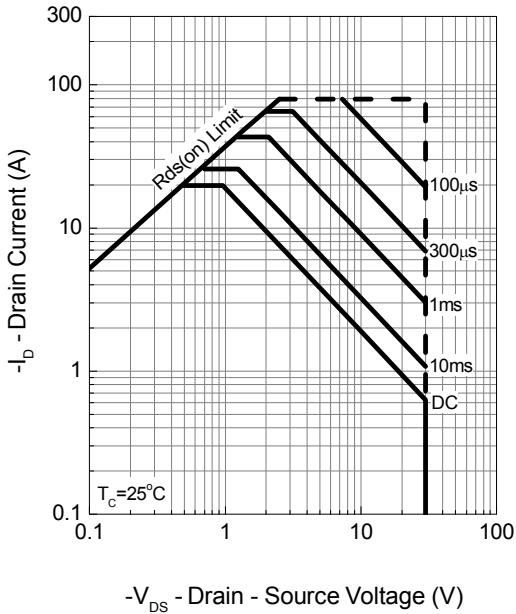
**Power Dissipation**



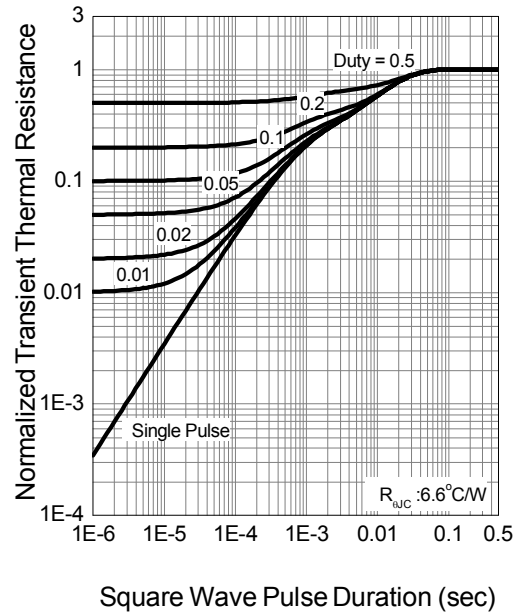
**Drain Current**



**Safe Operation Area**

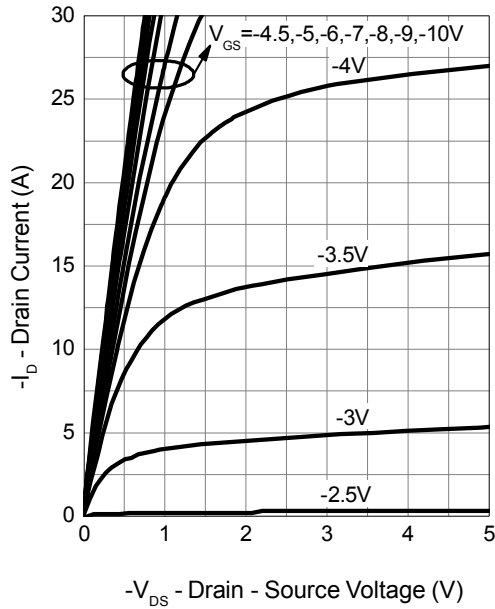


**Thermal Transient Impedance**

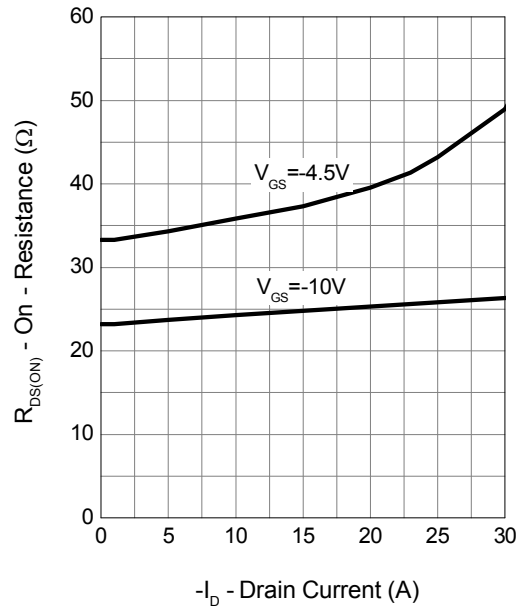


**P-Channel Typical Characteristics**

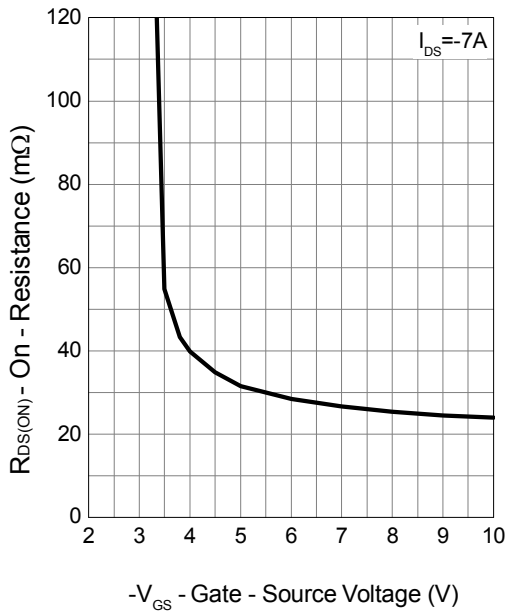
**Output Characteristics**



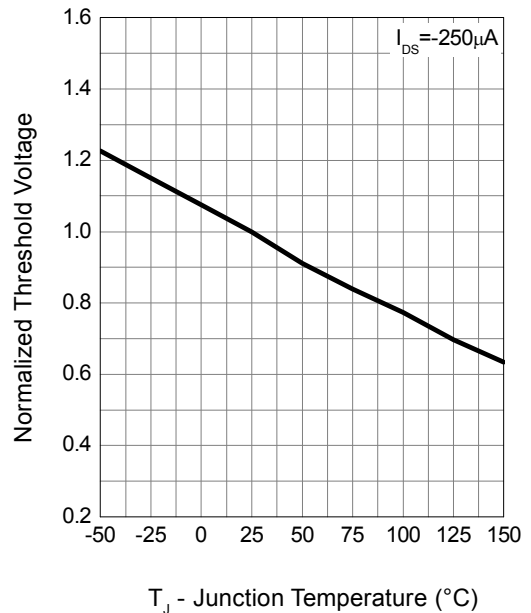
**Drain-Source On Resistance**



**Transfer Characteristics**



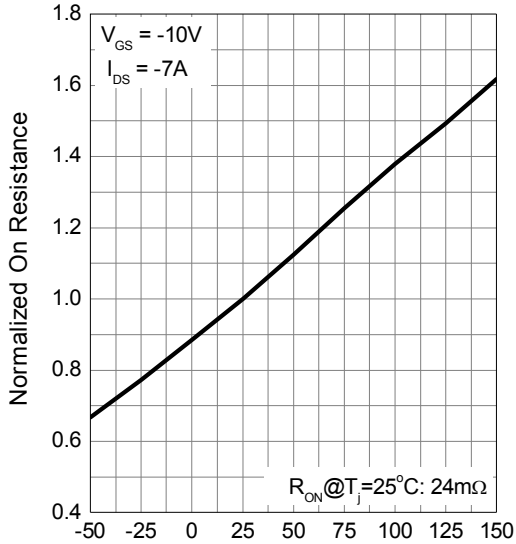
**Gate Threshold Voltage**





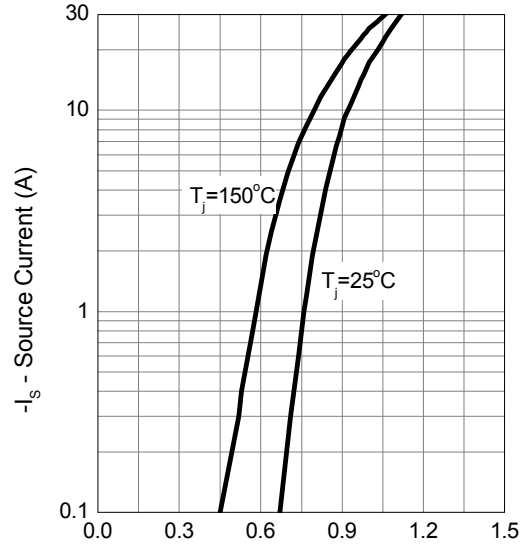
**P-Channel Typical Characteristics**

**Drain-Source On Resistance**



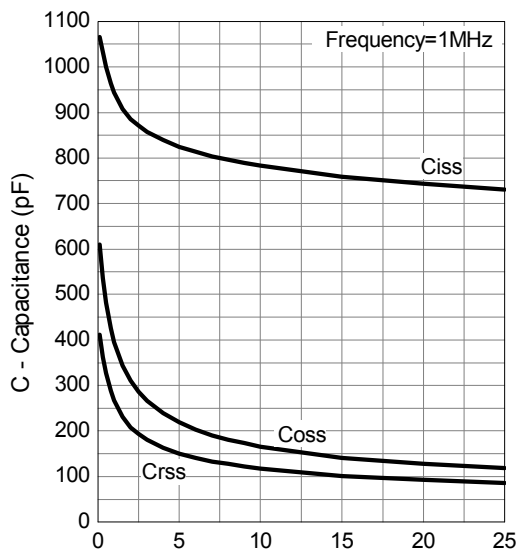
$T_j$  - Junction Temperature ( $^{\circ}C$ )

**Source-Drain Diode Forward**



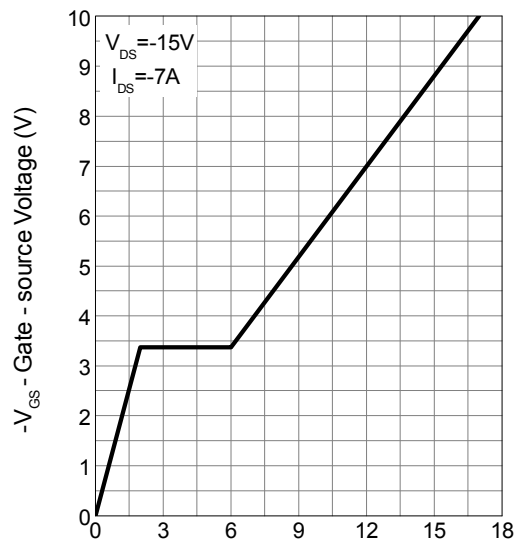
$-V_{SD}$  - Source - Drain Voltage (V)

**Capacitance**



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

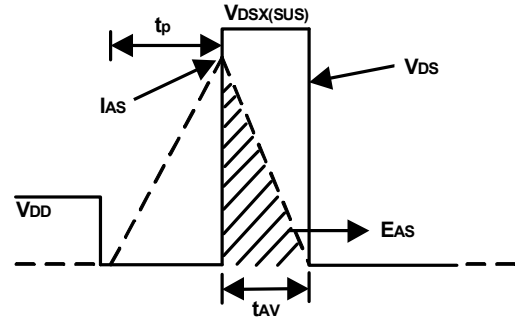
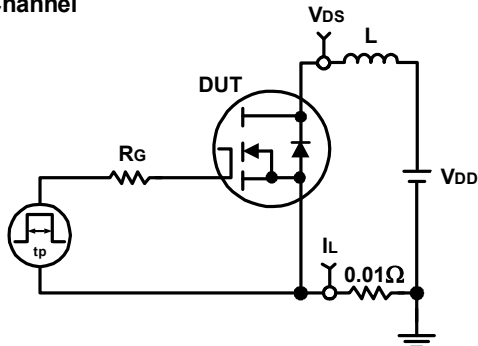
**Gate Charge**



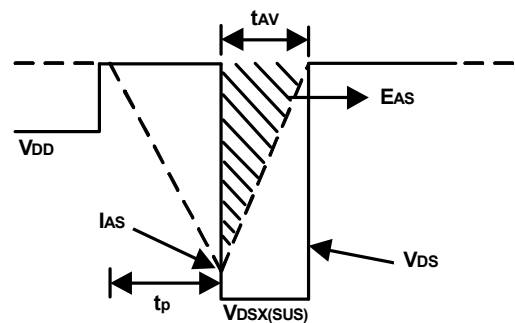
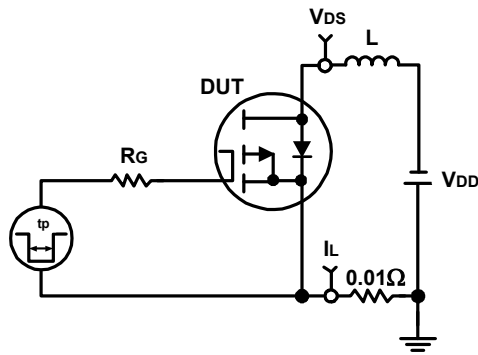
$Q_G$  - Gate Charge (nC)

### Avalanche Test Circuit and Waveforms

N Channel

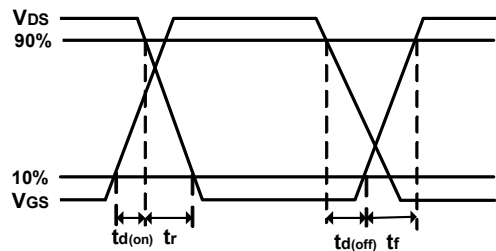
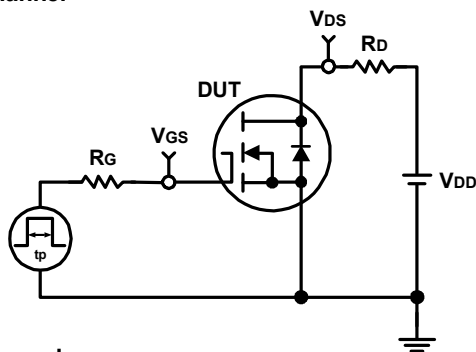


P Channel

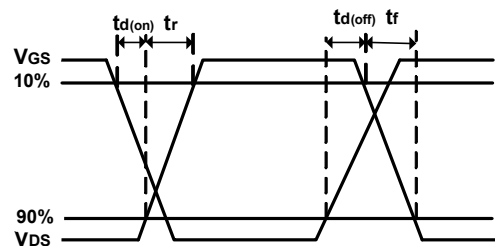
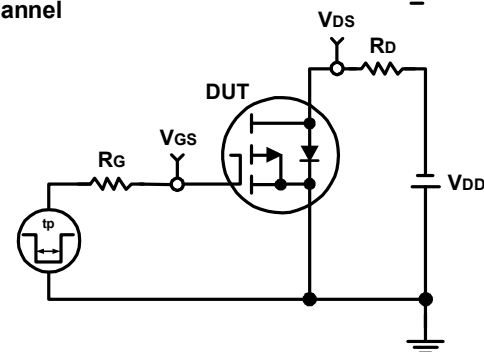


### Switching Time Test Circuit and Waveforms

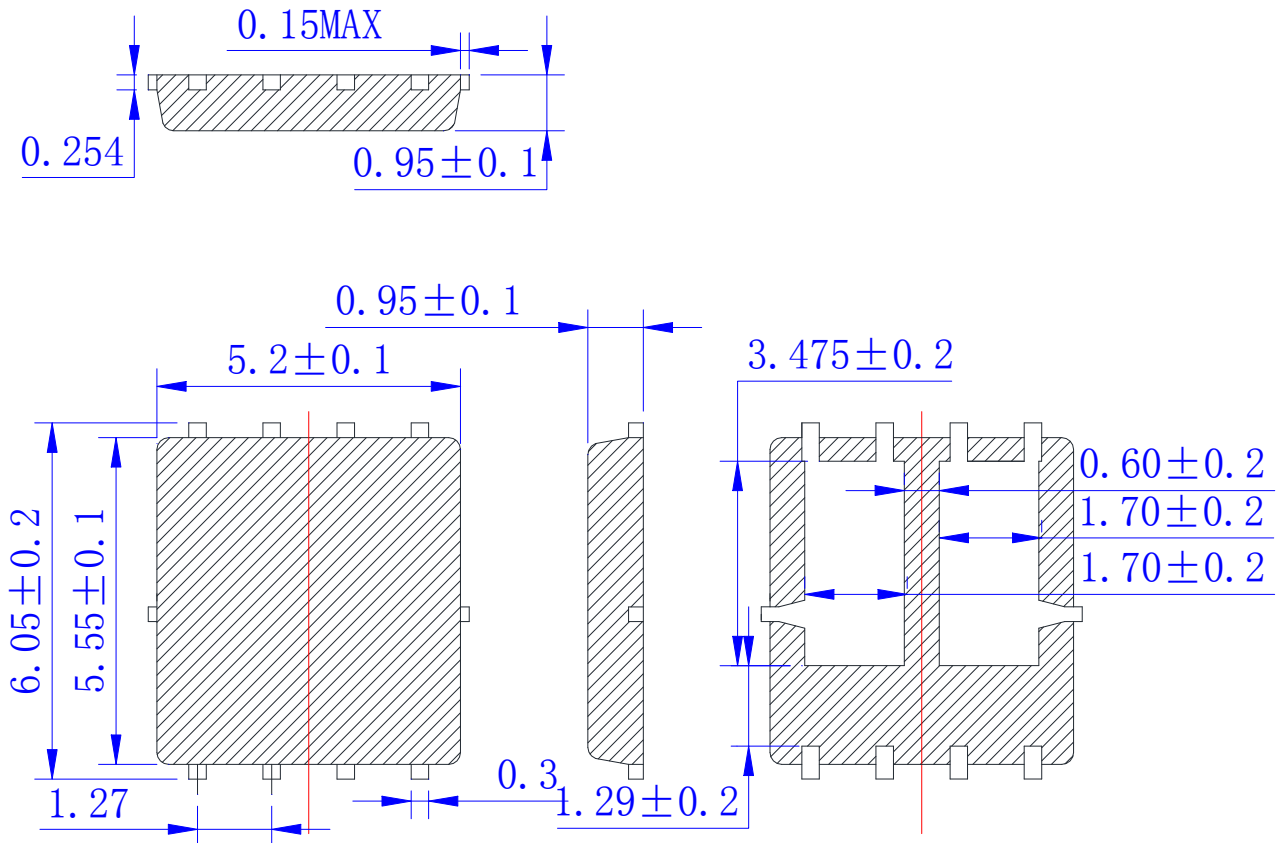
N Channel



P Channel



**DFN5×6C-8 OUTLINE**



NAME	DFN5X6C-8 OUTLINE	UNIT	mm	DESIGNED		<b>THIRD ANGLE SYSTEM</b> 
DWGNO		PAGE	1 OF 1	CHECKED		
VERSION	Ver. B	ISSUE DATE		APPROVED		



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