



**WANSEMI**  
万芯半导体

**WP4606**

# **Enhancement Mode N+P- Channel Power MOSFET**

SOP8/N+PMOS/30V/ $\pm 20$ V/1.7V/5.5A/15m $\Omega$ /

-30V/ $\pm 20$ V/-1.8V/-4.2A/32m $\Omega$

Rev0.8

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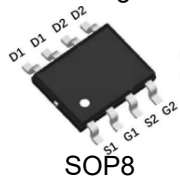
## 30V N+P-Channel MOSFET

### 1.Features

- ◆ Advanced trench technology
- ◆ Super low gate charge
- ◆ High density cell design for ultra low Rdson

### 2.Applications

- ◆ DC/DC Converter
- ◆ PWM
- ◆ Load Switching



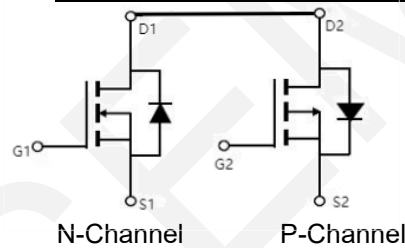
Pin Description

#### ◆ N-Channel

V <sub>DS</sub>	R <sub>DS(on)</sub> Typ.	I <sub>D</sub>
30V	15mΩ @ 10V	5.5A
	22mΩ @ 4.5V	

#### ◆ P-Channel

V <sub>DS</sub>	R <sub>DS(on)</sub> Typ.	I <sub>D</sub>
-30V	32mΩ @ -10V	-4.2A
	46mΩ @ -4.5V	



Schematic Diagram

### 3.Package Marking and Ordering Information

Part no.	Marking	Package	PCS/Tube	PCS/CTN.
WP4606	4606	SOP8	4,000	48,000

### 4.Absolute Max Ratings at Ta=25°C (Note1)

Parameter	Symbol	N-channel	P-channel	Units
Drain to Source Voltage	V <sub>DSS</sub>	30	-30	V
Gate to Source Voltage	V <sub>GSS</sub>	±20	±20	V
Drain Current (DC)	I <sub>D</sub>	5.5	-4.2	A
Drain Current (Pulse), PW≤300μs	I <sub>DM</sub>	30	-30	A
Total Dissipation	P <sub>D</sub>	2.0	2.0	W
Avalanche Energy, Single Pulsed	EAS	30	25	mJ
Junction Temperature	T <sub>J</sub>	150	150	°C
Storage Temperature	T <sub>stg</sub>	-55 to +150	-55 to +150	°C

Note 1: Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

**5. Thermal Resistance Ratings (Note 2)**

Parameter	Symbol	Value	Unit
Maximum Junction-to-Ambient	$R_{\theta JA}$	63.2	$^{\circ}C/W$

Note 2: When mounted on 1 inch square copper board  $t \leq 10$ sec The value in any given application depends on the user's specific board design.

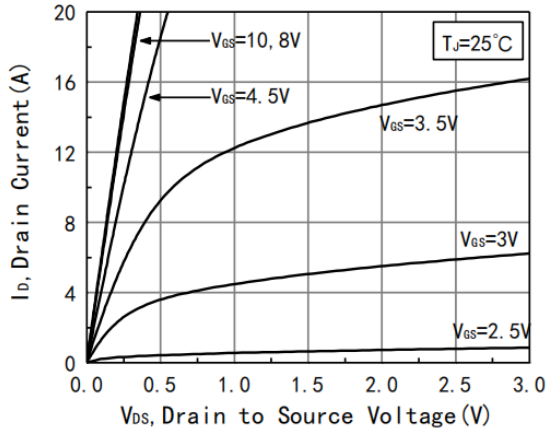
**6. NMOS Electrical Characteristics at  $T_a=25^{\circ}C$  (Note 3)**

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = 250\mu A, V_{GS} = 0V$	30	34	-	V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 30V, V_{GS} = 0V$	-	-	1	$\mu A$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.1	1.7	2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = 5.5A, V_{GS} = 10V$	-	15	25	$m\Omega$
		$I_D = 5.5A, V_{GS} = 4.5V$	-	22	39	$m\Omega$
Input Capacitance	$C_{iss}$	$V_{GS}=0V,$	-	457	-	pF
Output Capacitance	$C_{oss}$	$V_{DS}=15V,$	-	74	-	pF
Reverse Transfer Capacitance	$C_{rss}$	Frequency=1.0MHz	-	63	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = 15V$ $V_{GS} = 10V$ $R_{GEN} = 3\Omega$ $I_D = 3A$	-	10	-	ns
Rise Time	$t_r$		-	15	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	30	-	ns
Fall Time	$t_f$		-	6	-	ns
Total Gate Charge	$Q_g$		$V_{DS} = 15V,$	-	10	-
	$Q_{gs}$	$V_{GS} = 10V,$	-	1	-	nC
	$Q_{gd}$	$I_D = 1A$	-	2.3	-	nC
Diode Forward Voltage	$V_{FSD}$	$I_S = 5.5A, V_{GS} = 0V$	0.5	0.8	1.1	V

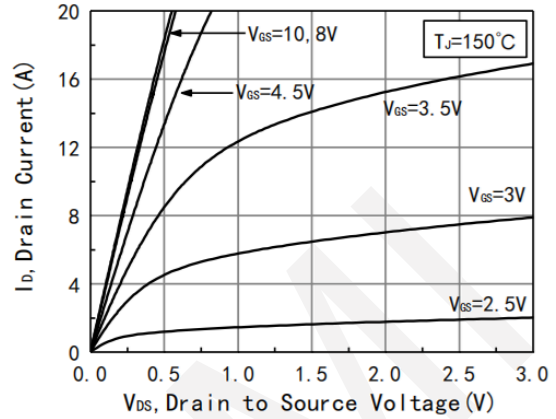
Note 3: Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.



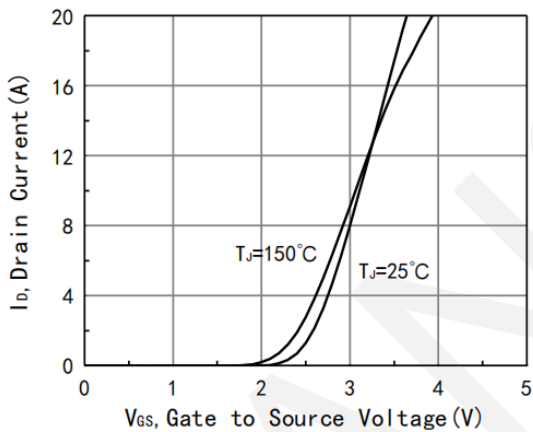
### NMOS Typical electrical and thermal characteristics



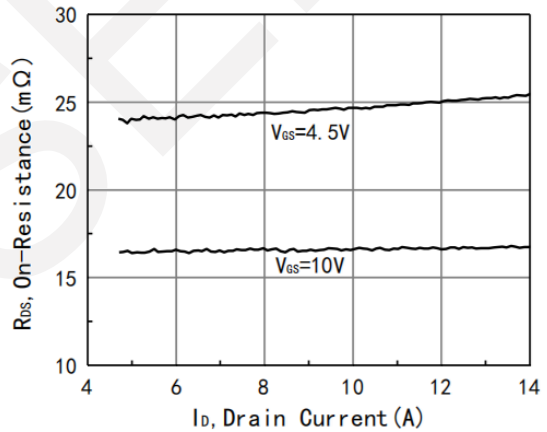
Typical Output Characteristics



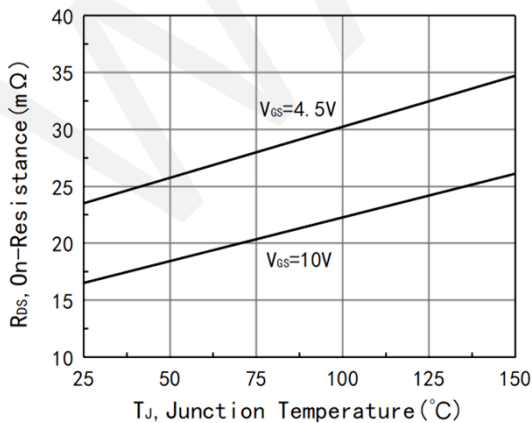
Typical Transfer Characteristics



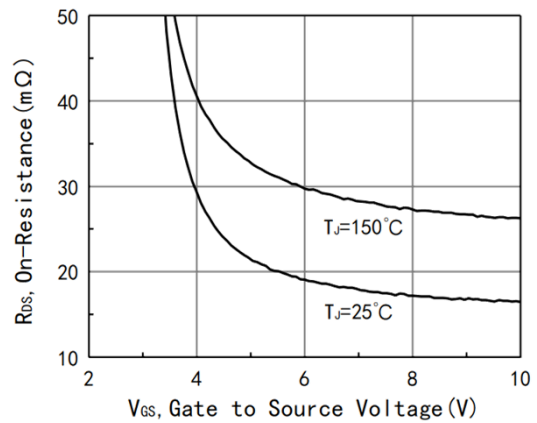
Typical Transfer Characteristics



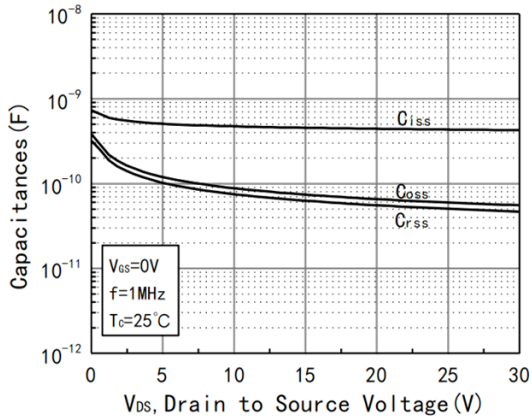
$R_{DS(on)}$  vs  $I_D$



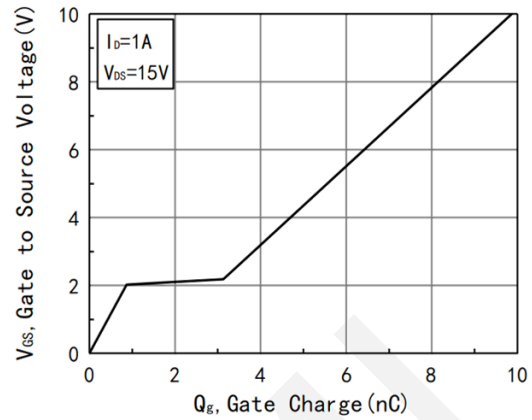
$R_{DS(on)}$  vs  $T_J$



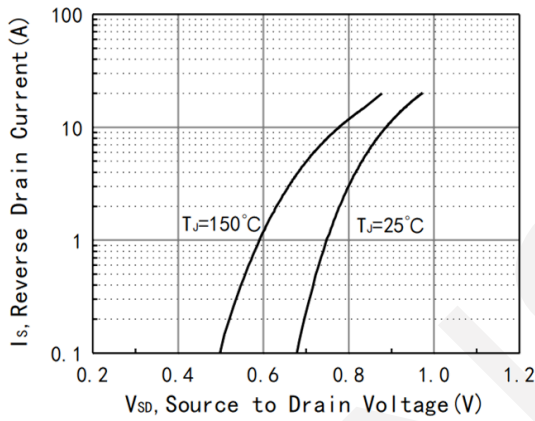
$R_{DS(on)}$  vs  $V_{GS}$



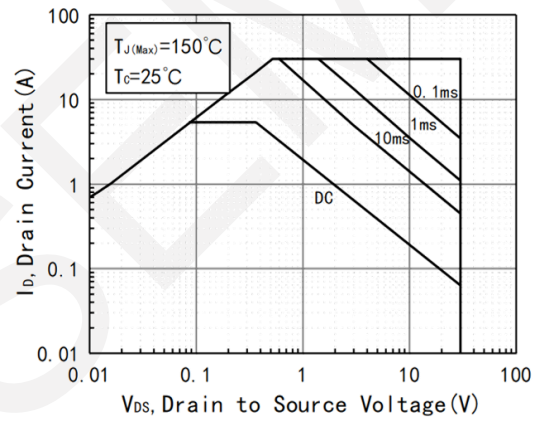
Capacitance vs Vds



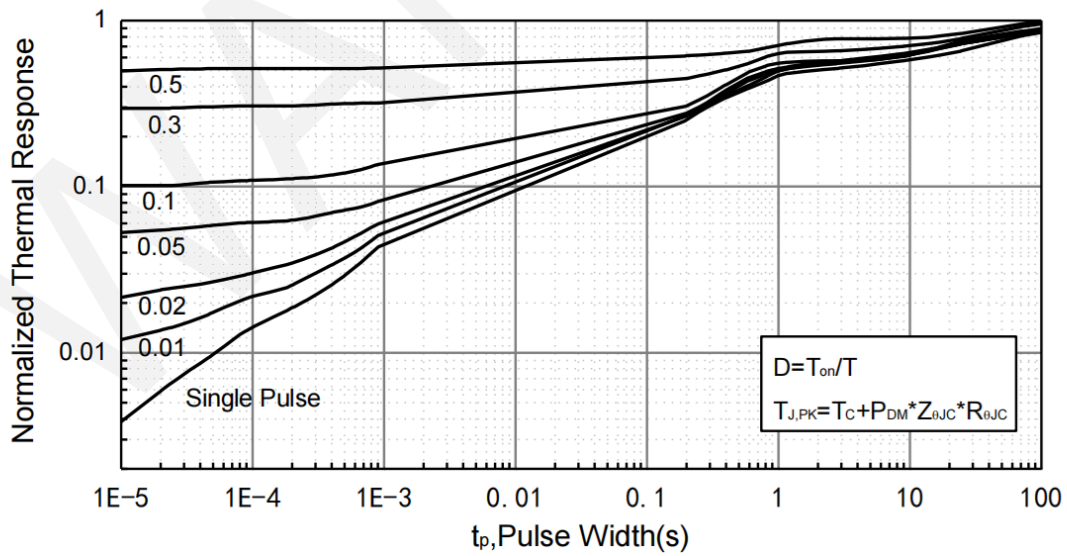
Gate Charge Characteristic



Diode Forward Characteristic



Safe Operating Area



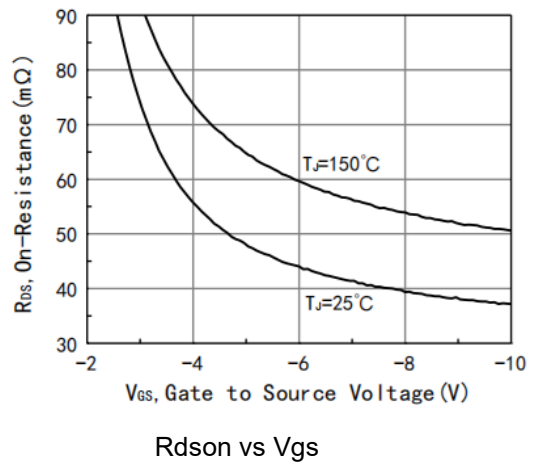
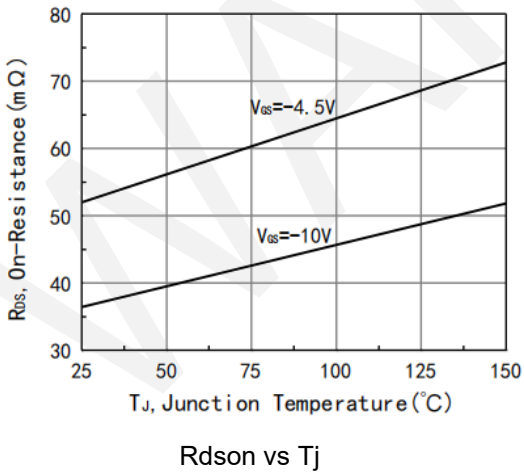
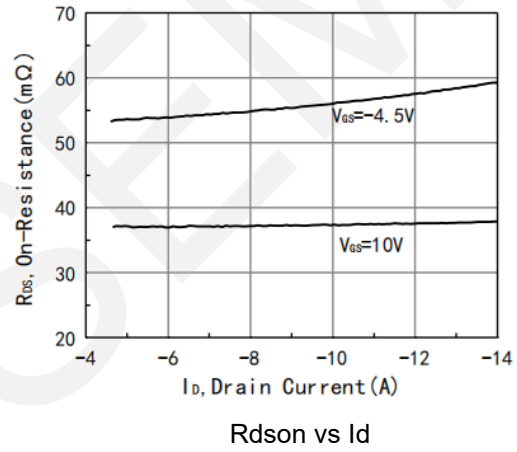
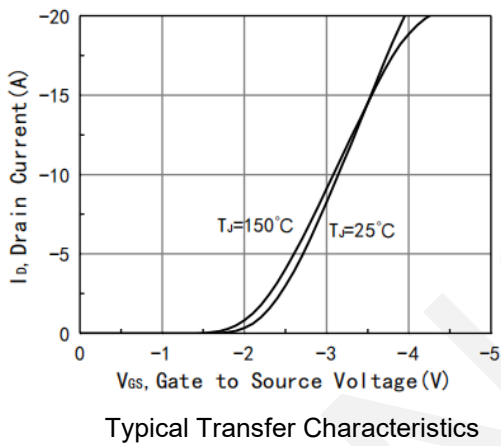
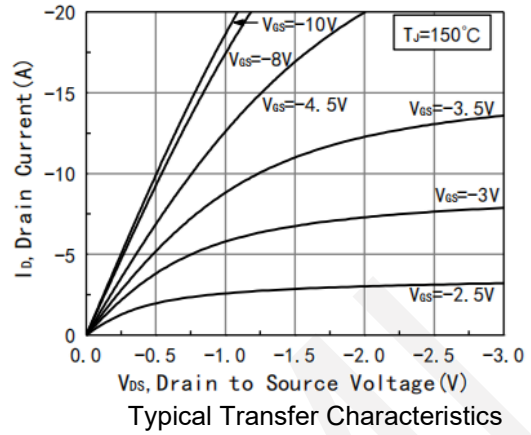
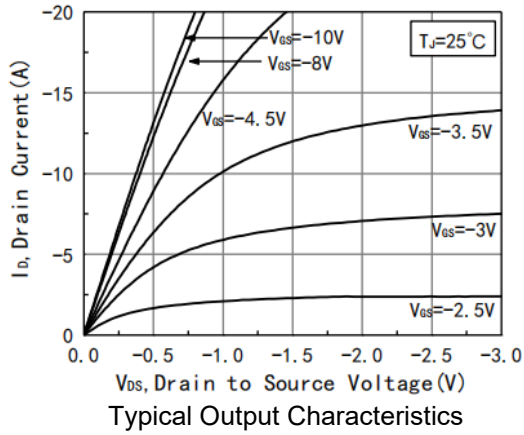
Normalized Maximum Transient Thermal Impedance

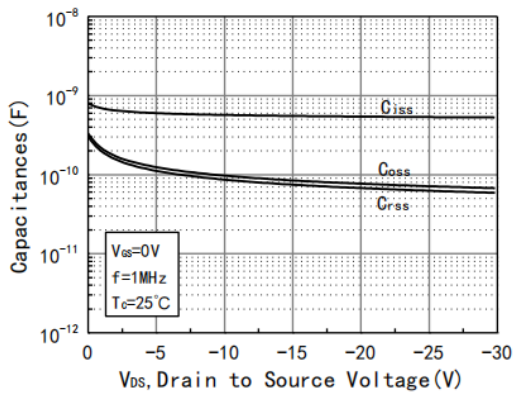
**7.PMOS Electrical Characteristics at Ta=25°C**

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Units
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	$I_D = -250\mu A, V_{GS} = 0V$	-30	-36	-	V
Zero-Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = -30V, V_{GS} = 0V$	-	-	-1	$\mu A$
Gate to Source Leakage Current	$I_{GSS}$	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_{DS}=-250\mu A$	-1.0	-1.8	-2.5	V
Static Drain to Source On-State Resistance	$R_{DS(on)}$	$I_D = -4.2A, V_{GS} = -10V$	-	32	39	m $\Omega$
		$I_D = -4.2A, V_{GS} = -4.5V$	-	46	60	m $\Omega$
Input Capacitance	$C_{iss}$	$V_{GS}=0V,$	-	550	-	pF
Output Capacitance	$C_{oss}$	$V_{DS}=-15V,$	-	85	-	pF
Reverse Transfer Capacitance	$C_{rss}$	Frequency=1.0MHz	-	75	-	pF
Turn-ON Delay Time	$t_{d(on)}$	$V_{DD} = -15V$ $V_{GS} = -10V$ $R_{GEN} = 3\Omega,$ $I_D = -3A$	-	9.5	-	ns
Rise Time	$t_r$		-	5.5	-	ns
Turn-OFF Delay Time	$t_{d(off)}$		-	42.5	-	ns
Fall Time	$t_f$		-	13.6	-	ns
Total Gate Charge	$Q_g$	$V_{DS} = -15V,$	-	11	-	nC
	$Q_{gs}$	$V_{GS} = -10V,$	-	2.5	-	nC
	$Q_{gd}$	$I_D = -1A$	-	3	-	nC
Diode Forward Voltage	$V_{FSD}$	$I_S = -4.2A, V_{GS} = 0V$	-0.5	-0.9	-1.1	V

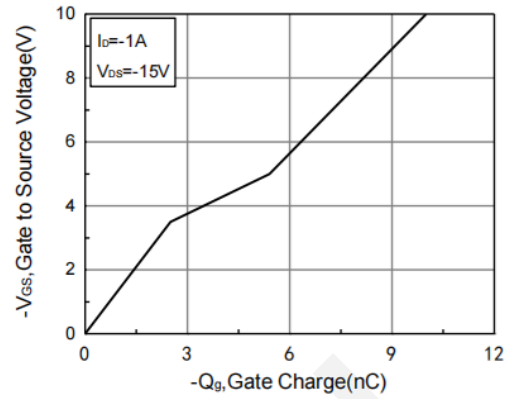


### PMOS Typical electrical and thermal characteristics

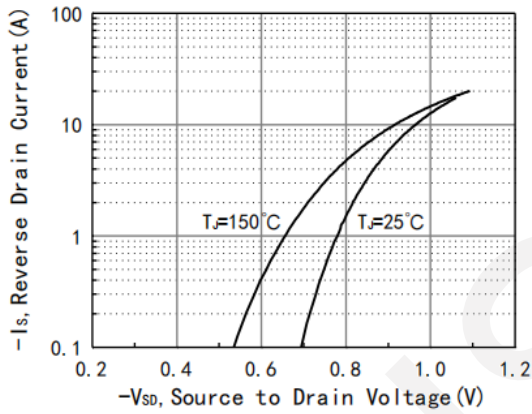




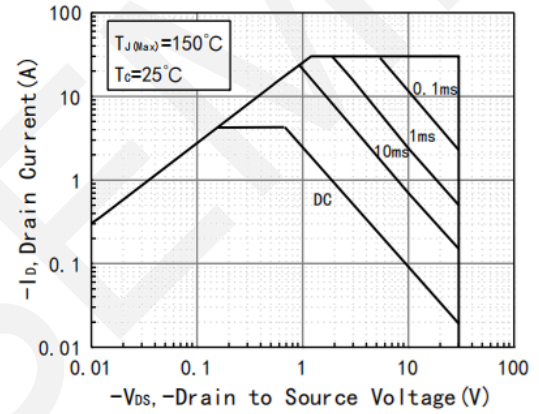
Capacitance vs Vds



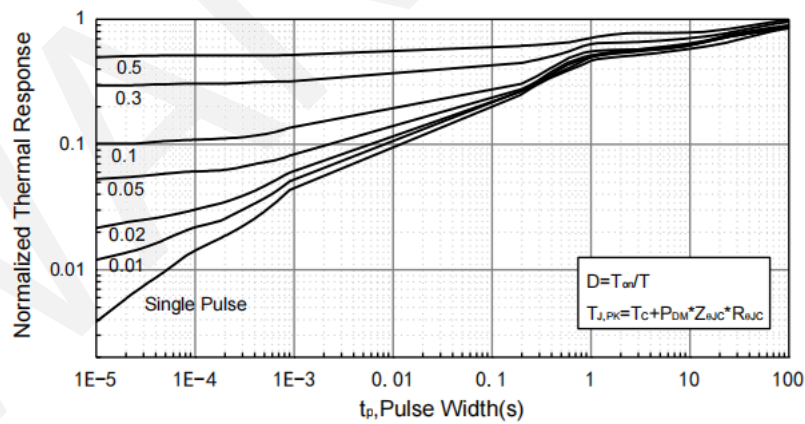
Gate Charge Characteristic



Diode Forward Characteristic



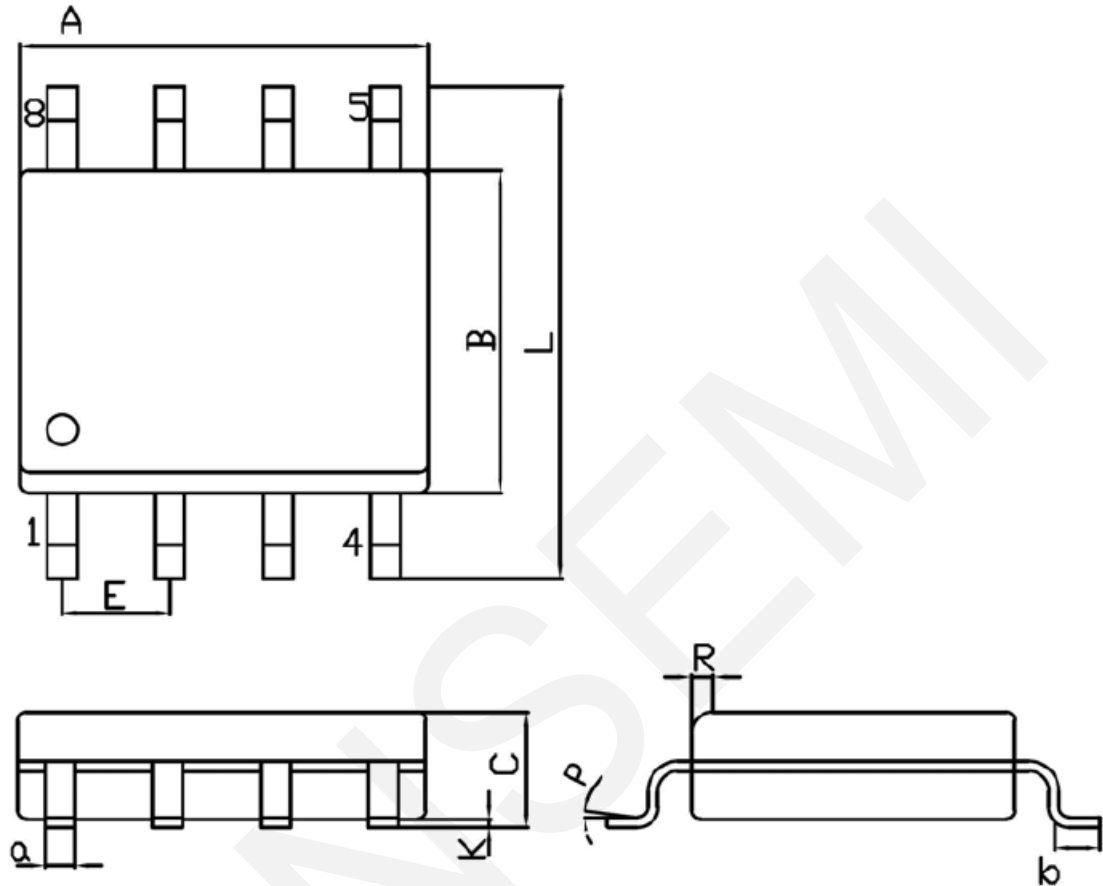
Safe Operating Area



Normalized Maximum Transient Thermal Impedance



**8.Package Dimensions**



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	4.70	5.10	C	1.35	1.75
B	3.70	4.10	a	0.35	0.49
L	5.80	6.20	R	0.30	0.60
E	1.27BSC		P	0°	7°
K	0.12	0.22	b	0.40	1.25

## 9. Important Notice

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