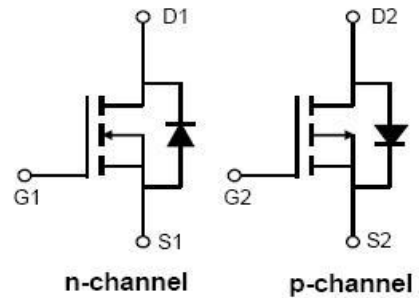




### 30V Complementary MOSFET

#### Description

The MX4606 uses advanced trench technology to provide excellent RDS(ON), low gate charge. This device may be used to form a level shifted high side switch, and for a host of other applications.



#### Schematic diagram

#### General Features

- N-Channel
- VDS = 30V, ID = 6A
- RDS(ON) (Typ.) 20mΩ @ VGS = 10V
- RDS(ON) (Typ.) 29mΩ @ VGS = 4.5V

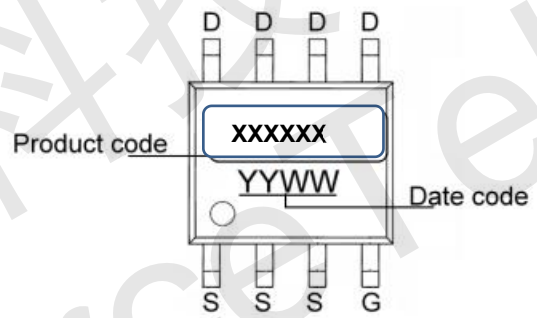
#### P-Channel

- VDS = -30V, ID = -5A
- RDS(ON) (Typ.) 38mΩ @ VGS = -10V
- RDS(ON) (Typ.) 58mΩ @ VGS = -4.5V

- High Power and current handling capability
- Lead free product is acquired
- Surface mount package

#### Application

- PWM applications
- Load switch
- Power management



Marking and pin assignment

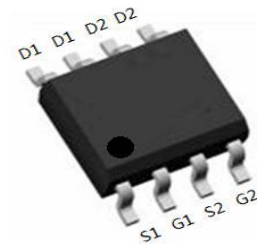


Table 1. Absolute Maximum Ratings (TA=25°C)

SOP-8 top view

Symbol	Parameter	N-Channel	P-Channel	Unit
V <sub>DS</sub>	Drain-Source Voltage (V <sub>GS</sub> =0V)	30	-30	V
V <sub>GS</sub>	Gate-Source Voltage (V <sub>DS</sub> =0V)	±20	±20	V
I <sub>D</sub>	Drain Current-Continuous	6	-5	A
I <sub>DM (pluse)</sub>	Drain Current-Continuous@ Current-Pulsed	30	-30	A
P <sub>D</sub>	Maximum Power Dissipation	2.5	2.5	W
T <sub>J</sub> , T <sub>STG</sub>	Operating Junction and Storage Temperature Range	-55 To 150	-55 To 150	°C



**Table 2. Thermal Characteristic**

Symbol	Parameter	Value	Unit
R <sub>θJA</sub>	Thermal Resistance, Junction-to-Ambient	50	°C/W

**Table 3.**

**N-Channel Electrical Characteristics (TA=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	30	-	-	V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V			1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	1	1.5	2.5	V
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =5V, I <sub>D</sub> =6A	3	7		S
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =6A		20	30	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =5A		29	42	mΩ
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =15V, V <sub>GS</sub> =0V, f=1.0MHz		580		pF
C <sub>oss</sub>	Output Capacitance			96		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			72		pF
<b>Switching Times</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =15V, I <sub>D</sub> =6A, R <sub>L</sub> =15Ω V <sub>GS</sub> =10V, R <sub>G</sub> =2.5Ω		10		nS
t <sub>r</sub>	Turn-on Rise Time			4		nS
t <sub>d(off)</sub>	Turn-Off Delay Time			27		nS
t <sub>f</sub>	Turn-Off Fall Time			5		nS
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =10V, I <sub>D</sub> =6A, V <sub>GS</sub> =10V		13		nC
Q <sub>gs</sub>	Gate-Source Charge			1.5		nC
Q <sub>gd</sub>	Gate-Drain Charge			4.5		nC
<b>Source-Drain Diode Characteristics</b>						
I <sub>SD</sub>	Source-Drain Current(Body Diode)				6	A
V <sub>SD</sub>	Forward on Voltage <b>(Note 1)</b>	V <sub>GS</sub> =0V, I <sub>S</sub> =6A		0.89	1.2	V

Notes 1. Repetitive Rating: Pulse width limited by maximum junction temperature.



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Power Dissipation

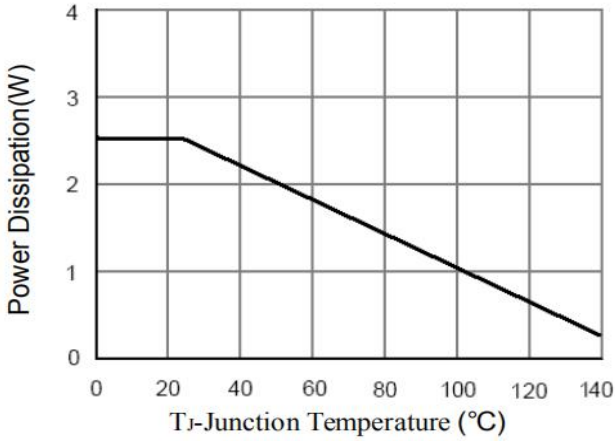


Figure2. Drain Current

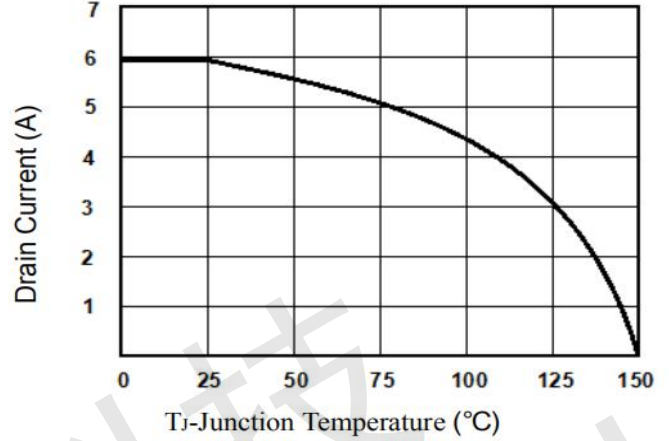


Figure3. Output Characteristics

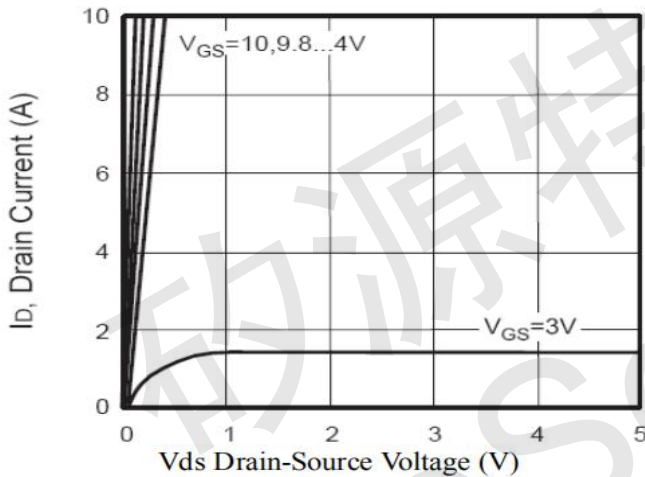


Figure4. Transfer Characteristics

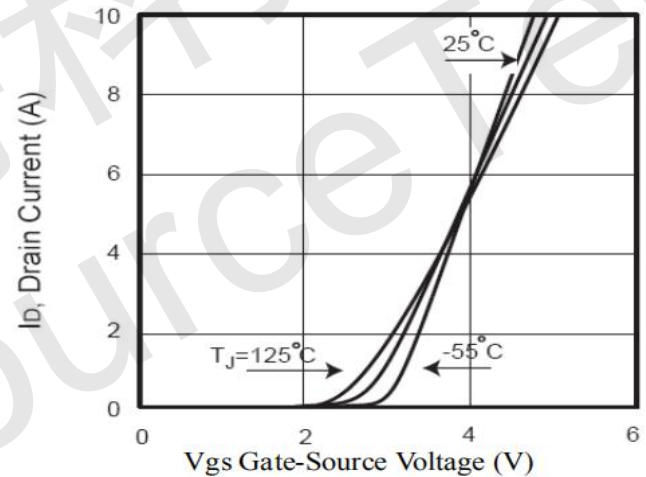


Figure5. Capacitance

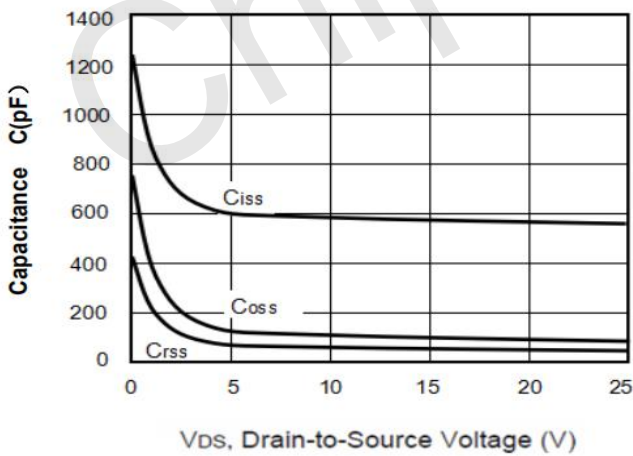


Figure6. R<sub>DS(ON)</sub> vs Junction Temperature

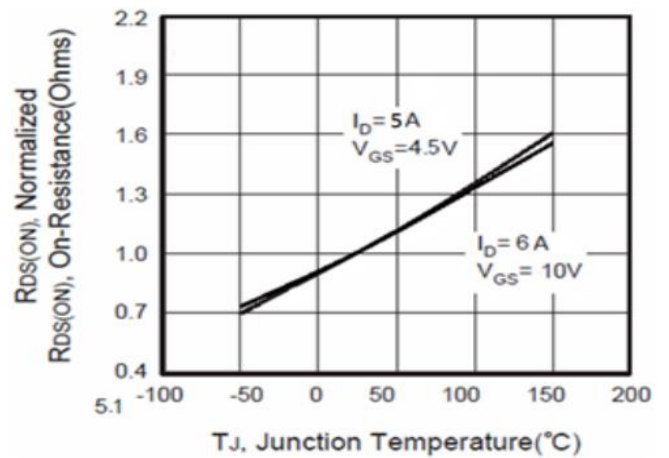




Figure7. Max  $BV_{DSS}$  vs Junction Temperature

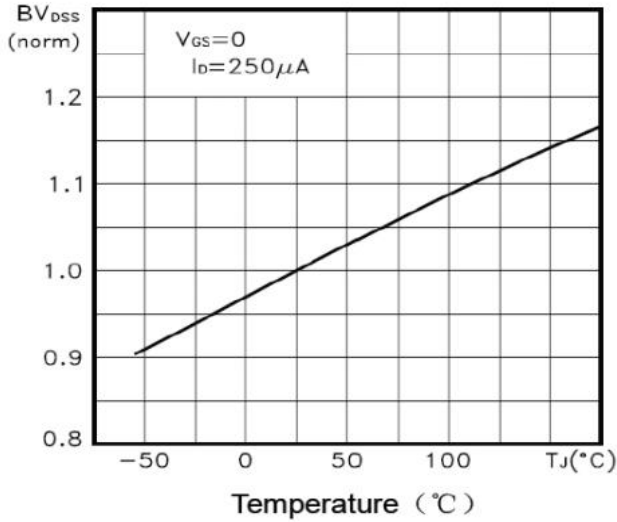


Figure8.  $V_{GS(th)}$  vs Junction Temperature

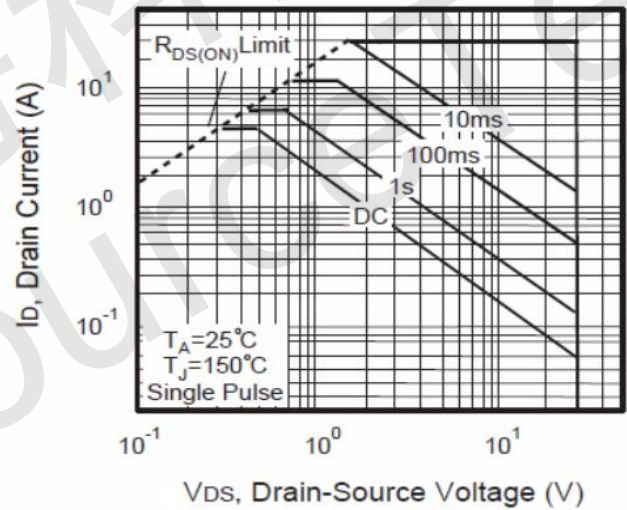
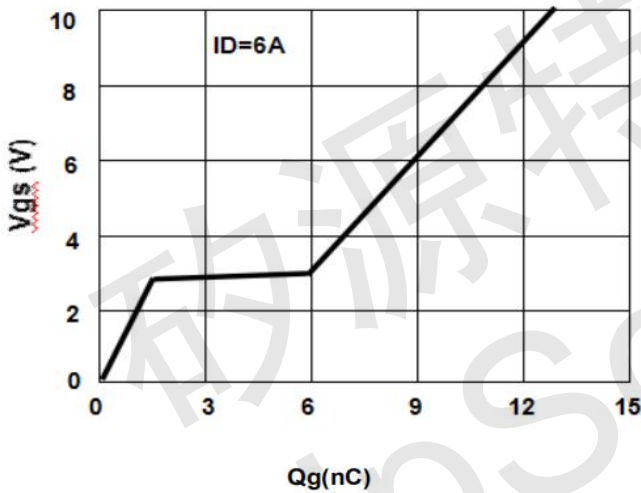
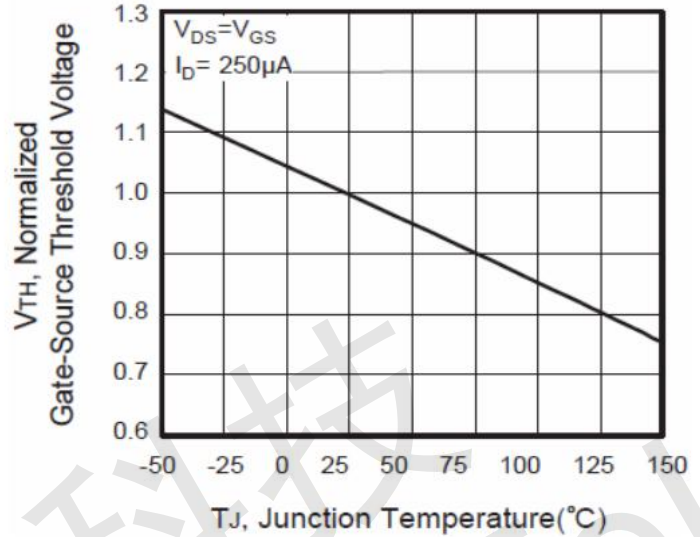
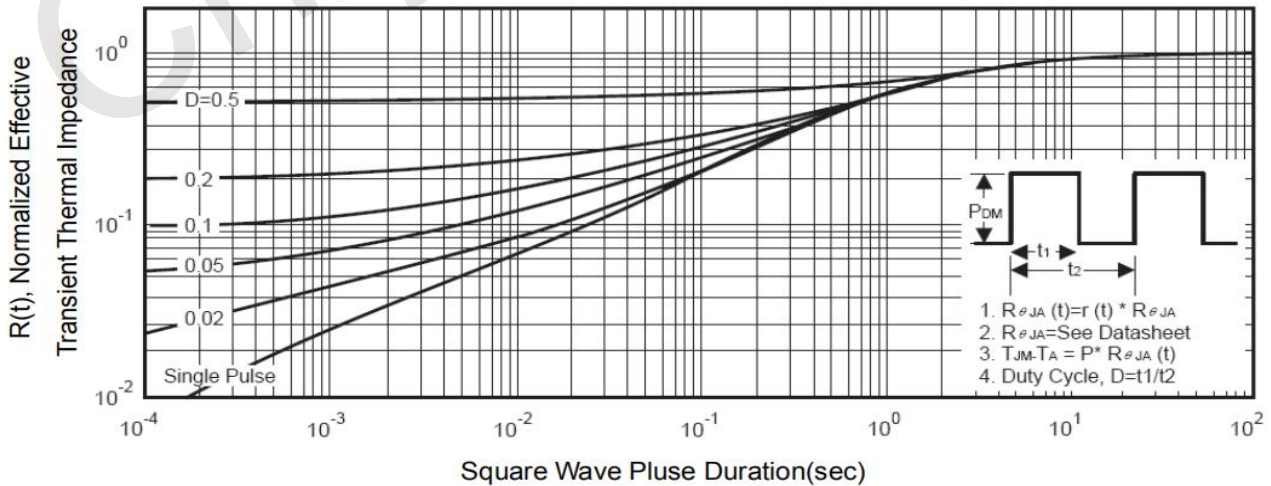


Figure11. Normalized Maximum Transient Thermal Impedance





**Table 4.**  
**P-Channel Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>On/Off States</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250μA	-30			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =-24V, V <sub>GS</sub> =0V			-1	μA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250μA	-1	-1.6	-3	V
g <sub>FS</sub>	Forward Transconductance	V <sub>DS</sub> =-5V, I <sub>D</sub> =-5A	4	9		S
R <sub>DS(ON)</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =-10V, I <sub>D</sub> =-5A		38	49	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-4A		58	90	mΩ
<b>Dynamic Characteristics</b>						
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1.0MHz		605		pF
C <sub>oss</sub>	Output Capacitance			106		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			79		pF
<b>Switching Times</b>						
t <sub>d(on)</sub>	Turn-on Delay Time	V <sub>DD</sub> =-15V, I <sub>D</sub> =-1A, R <sub>L</sub> =15Ω V <sub>GS</sub> =-10V, R <sub>G</sub> =2.5Ω		11		nS
t <sub>r</sub>	Turn-on Rise Time			5		nS
t <sub>d(off)</sub>	Turn-Off Delay Time			30		nS
t <sub>f</sub>	Turn-Off Fall Time			7		nS
Q <sub>g</sub>	Total Gate Charge				13	
Q <sub>gs</sub>	Gate-Source Charge	V <sub>DS</sub> =-15V, I <sub>D</sub> =-5A, V <sub>GS</sub> =-10V		1.2		nC
Q <sub>gd</sub>	Gate-Drain Charge			4.5		nC
<b>Source-Drain Diode Characteristics</b>						
I <sub>SD</sub>	Source-Drain Current(Body Diode)				-5	A
V <sub>SD</sub>	Forward on Voltage <b>(Note 1)</b>	V <sub>GS</sub> =0V, I <sub>S</sub> =-1.7A			-1.2	V

Notes 1. Repetitive Rating: Pulse width limited by maximum junction temperature.



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Power Dissipation

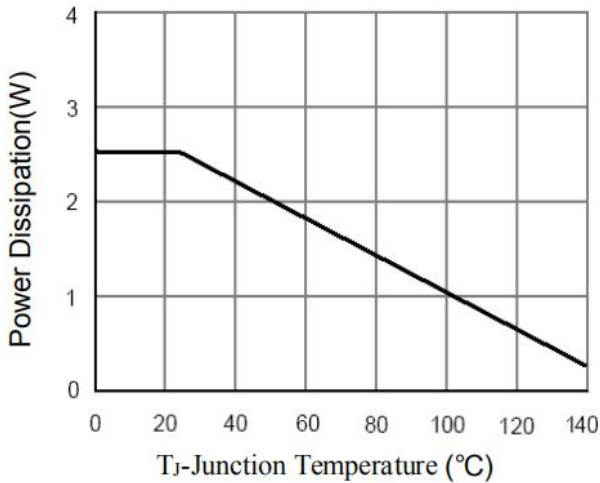


Figure2. Drain Current

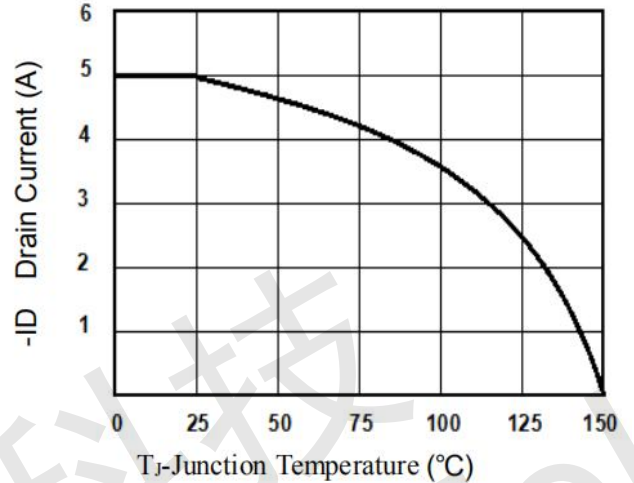


Figure3. Output Characteristics

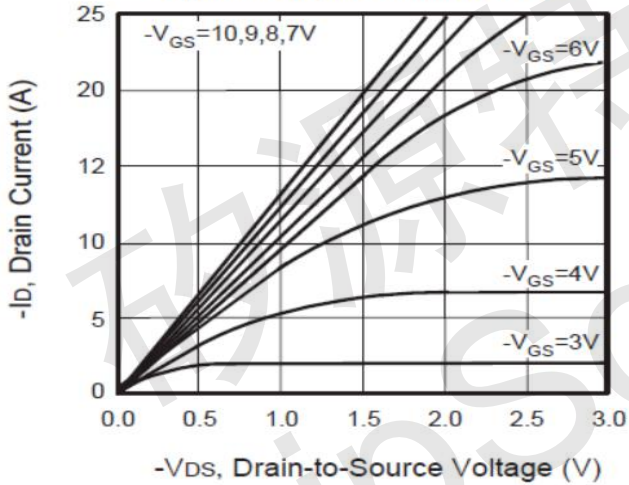


Figure4. Transfer Characteristics

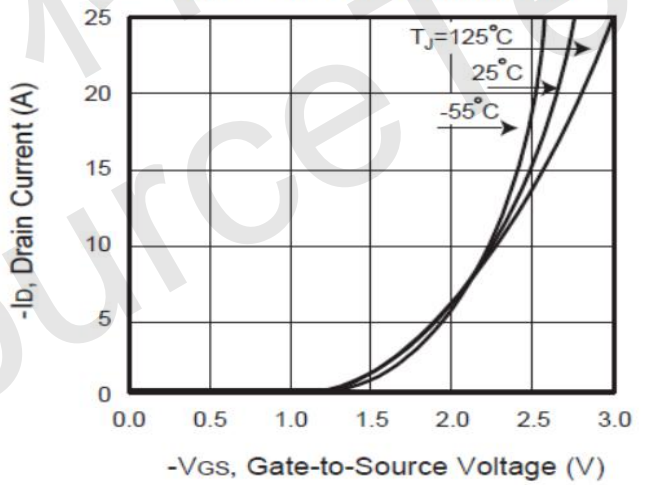


Figure5. Capacitance

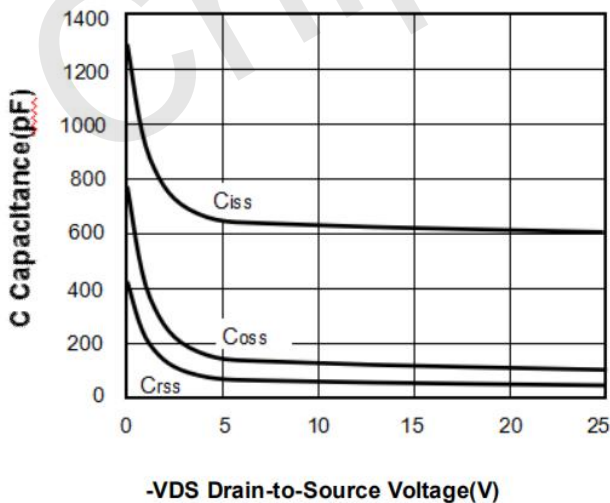


Figure6. R<sub>DS(ON)</sub> vs Junction Temperature

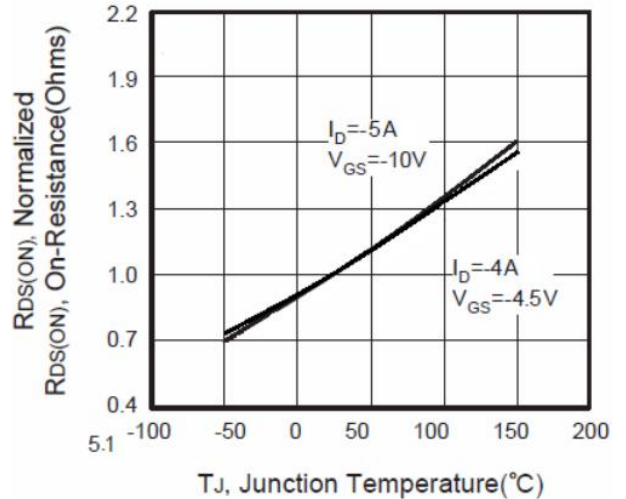




Figure7. MaxBV<sub>DSS</sub> vs Junction Temperature

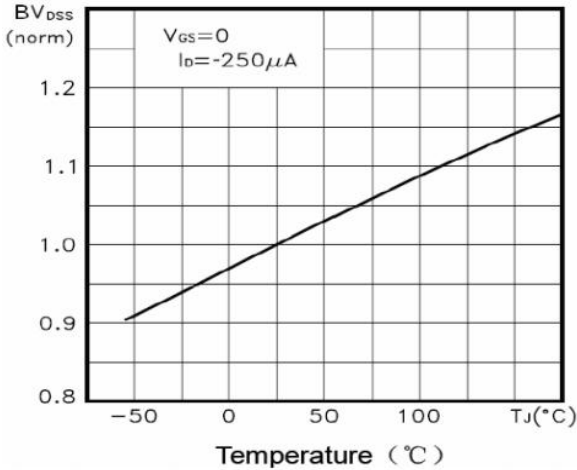


Figure8. V<sub>GS(th)</sub> vs Junction Temperature

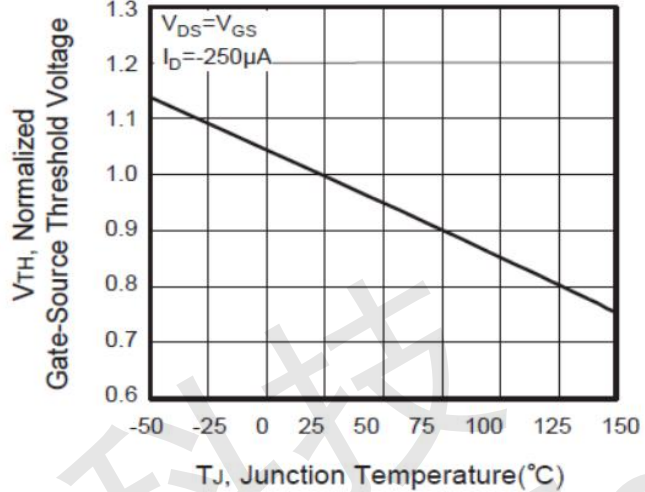


Figure9. Gate Charge Waveforms

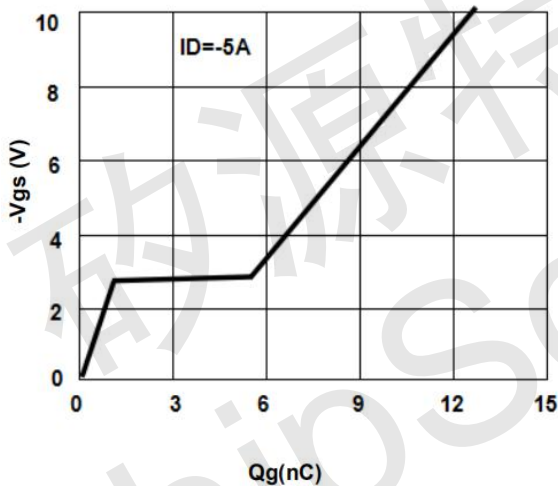


Figure10. Maximum Safe Operating Area

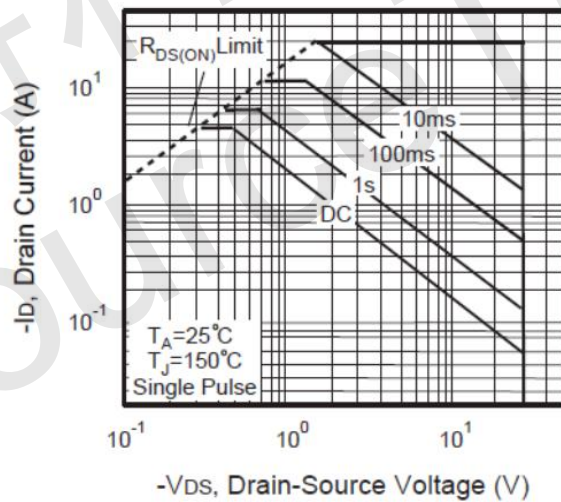
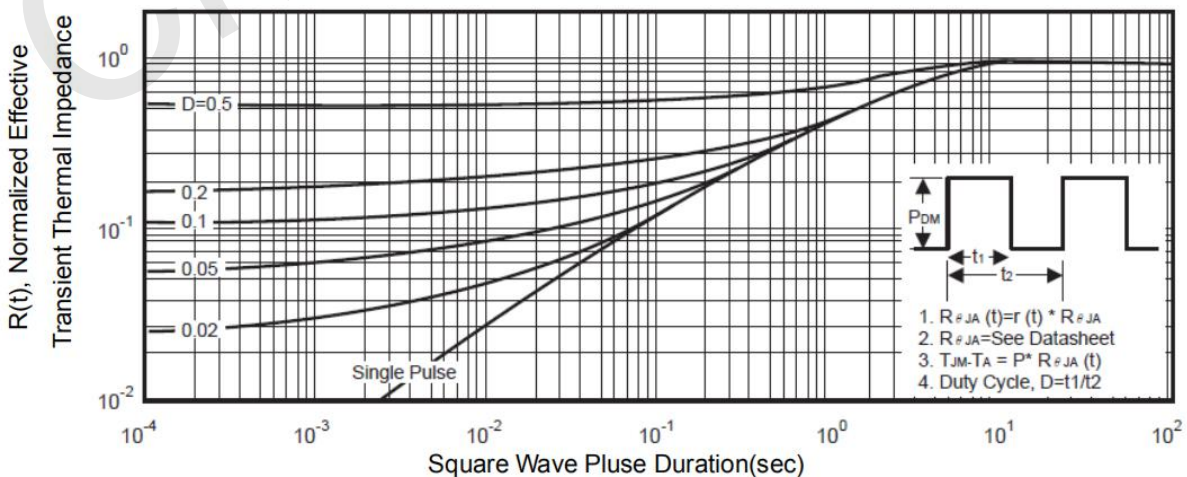
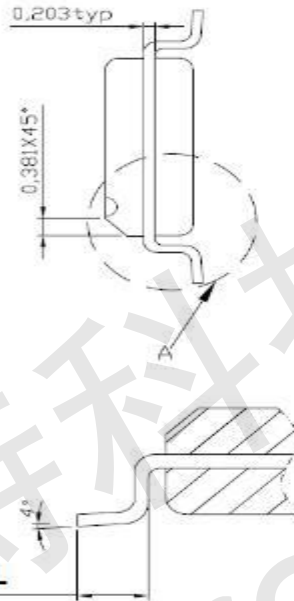
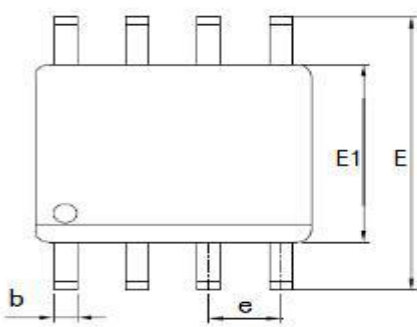


Figure11. Normalized Maximum Transient Thermal Impedance

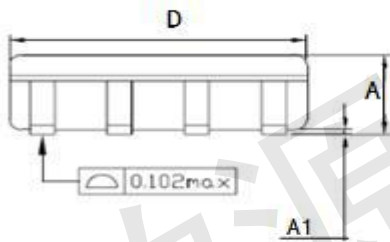




## SOP-8 Package Information



COMMON DIMENSIONS			
SYMBOL	mm		
	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.1	0.15	0.2
b	0.346	0.406	0.466
D	4.8	4.89	4.98
E	5.75	6.00	6.25
E1	3.81	3.90	3.99
e	1.27TYP		
L	0.406	0.838	1.27



A 局部放大