Product Summary

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	13mΩ@10V	9A
	18mΩ@4.5V	
-40V	26mΩ@-10V	-7A
	35mΩ@-4.5V	

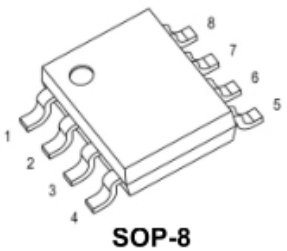
Feature

- N-Channel
  V_{DS} =40V,I_D =9A
  $R_{DS(ON)}$ < 18mΩ @ V_{GS}=10V
  $R_{DS(ON)}$ < 25mΩ @ V_{GS}=4.5V
- P-Channel
  V_{DS} =-40V,I_D = -7A
  $R_{DS(ON)}$ <35mΩ @ V_{GS}=-10V
  $R_{DS(ON)}$ < 45mΩ @ V_{GS}=-4.5V
- High power and current handing capability
- Surface mount package

Application

- Load Switch
- Battery Switch
- Power Management

Package



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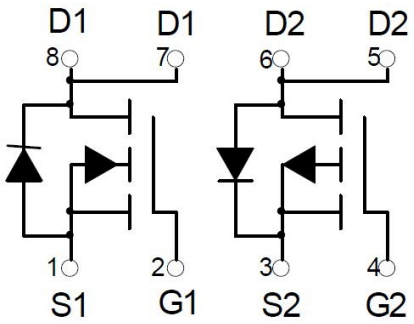
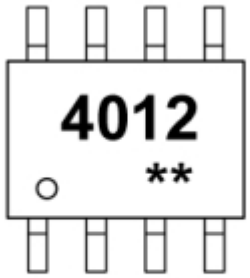
Circuit diagram



Marking



4012 : Product code
** : Week code.

Absolute maximum ratings

(T_a=25℃ unless otherwise noted)

Parameter	Symbol	Value		Unit
		N-Channel	P-Channel	
Drain-Source Voltage	V_{DS}	40	-40	V
Gate-Source Voltage	V_{GS}	±20	±20	V
Continuous Drain Current	I_D	9	-7	A
Pulsed Drain Current (1)	I_{DM}	36	-28	
Maximum Power Dissipation	P_D	2.0	2.0	W
Thermal Resistance from Junction to Ambient(t≤10s)	$R_{\theta JA}$	62.5		℃/W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55~ +150		℃

N-Electrical characteristics

(T_A=25℃, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$BV_{(BR)DSS}$	V_{GS} = 0V, I_D =250μA	40			V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} =32V, V_{GS} = 0V			1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	uA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =250μA	1	1.5	2.5	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =10V, I_D =7A		13	18	mΩ
		V_{GS} =4.5V, I_D =4A		18	25	
Forward Transconductance	g_{FS}	V_{DS} =5V, I_D =7A		32		S
Dynamic Characteristics						
Input capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, f=1MHz		1013		pF
Output capacitance	C_{oss}			107		
Reverse transfer capacitance	C_{rss}			76		
Switching Characteristics						
Turn-on Delay Time	$T_{d(on)}$	V_{DD}=20V, V_{GS} =10V, R_G=3.3Ω, I_D=7A		2.8		nS
Turn-on Rise Time	T_r			40.4		
Turn-Off Delay Time	$T_{d(off)}$			22.8		
Turn-Off Fall Time	t_f			6.4		
Total gate charge	Q_g	V_{DS} =32V, V_{GS} =4.5V, I_D =7A		9.8		nC
Gate-source charge	Q_{gs}			2.8		
Gate-drain charge	Q_{gd}			3.9		
Source-Drain Diode Characteristics						
Diode Forward Voltage	V_{SD}	I_S=1A, V_{GS}=0V, T_J=25℃			1.2	V

P-Channel Electrical characteristics

(T_A=25℃, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Off characteristics						
Drain-source breakdown voltage	$BV_{(BR)DSS}$	V_{GS} = 0V, I_D =-250μA	-40			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-40V, V_{GS} = 0V			-1	uA
Gate-body leakage current	I_{GSS}	V_{GS} =±20V, V_{DS} = 0V			±100	uA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1	-1.5	-2.5	V
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} =-10V, I_D =-5A		23	29	mΩ
		V_{GS} =-4.5V, I_D =-4A		32	43	
Forward Transconductance	g_{FS}	V_{DS} =-5V, I_D =-8A	20			S
Switching Characteristics						
Input Capacitance	C_{iss}	V_{DS} =-15V,V_{GS} =0V, f =1MHz		1415		pF
Output Capacitance	C_{oss}			134		
Reverse Transfer Capacitance	C_{rss}			102		
Switching Characteristics						
Turn-on Delay Time	$T_{d(on)}$	V_{DD}=-15V, V_{GS}=-10V, R_{GEN} =3.3Ω, I_D =-1A		22		nS
Turn-on Rise Time	T_r			15.7		
Turn-Off Delay Time	$T_{d(off)}$			59		
Turn-Off Fall Time	t_f			5.5		
Total Gate Charge	Q_g	V_{DS}=-15V, V_{GS}=-4.5V, I_D=-1A		11.5		nC
Gate-Source Charge	Q_{gs}			3.5		
Gate-Drain Charge	Q_{gd}			3.3		
Source-Drain Diode Characteristics						
Body Diode Voltage	V_{SD}	I_S=-1A, V_{GS} = 0V, T_J=25℃			-1.2	V

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
3. Guaranteed by design, not subject to production

N-Channel Typical Characteristics

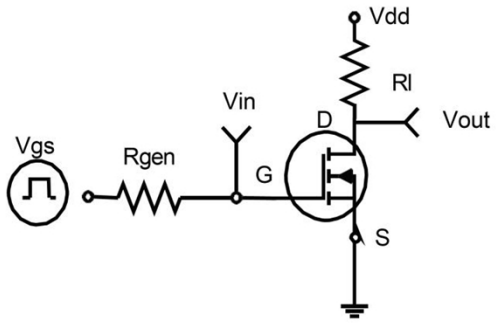


Figure 1:Switching Test Circuit

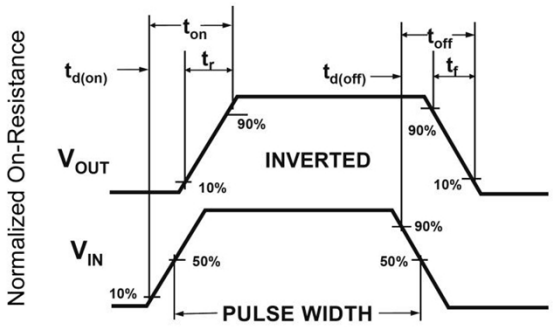


Figure 2:Switching Waveforms

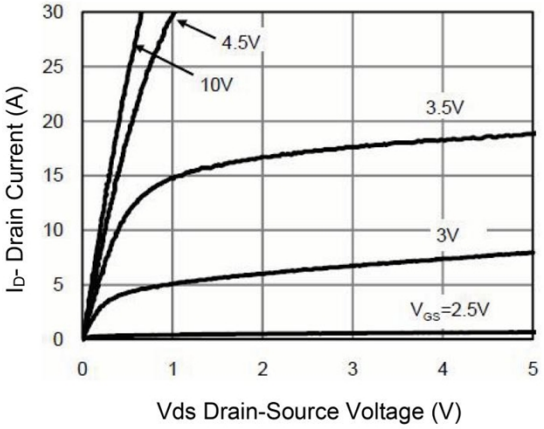


Figure 3 Output Characteristics

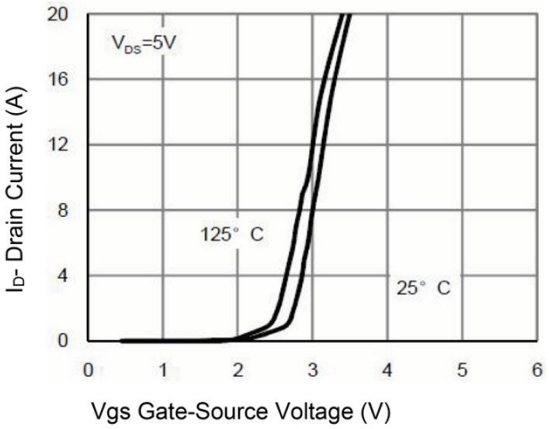


Figure 4 Transfer Characteristics

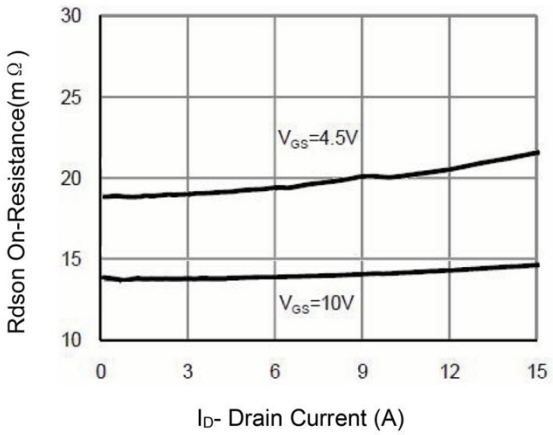


Figure 5 Drain-Source On-Resistance

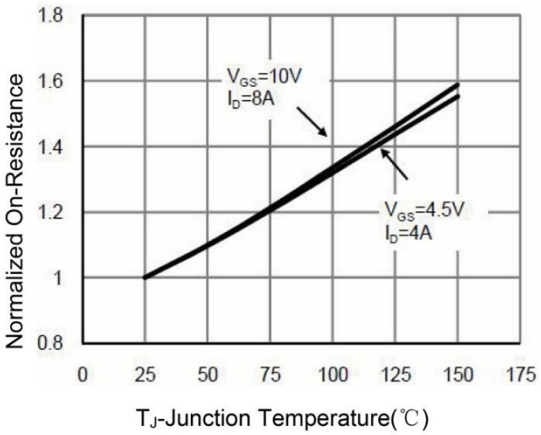


Figure 6 Drain-Source On-Resistance

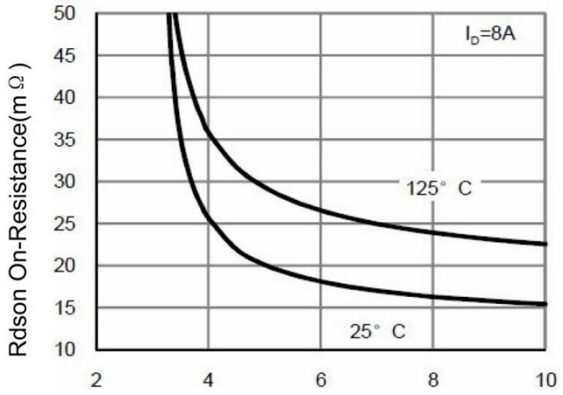


Figure7 Rdson vs Vgs

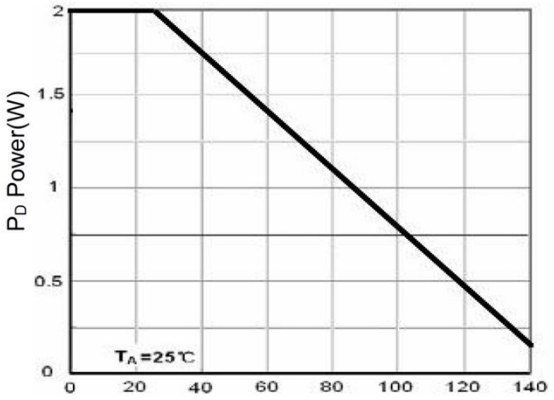


Figure 8 Power Dissipation

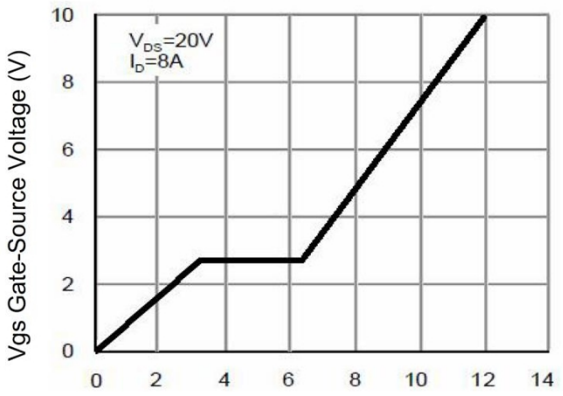


Figure 9 Gate Charge

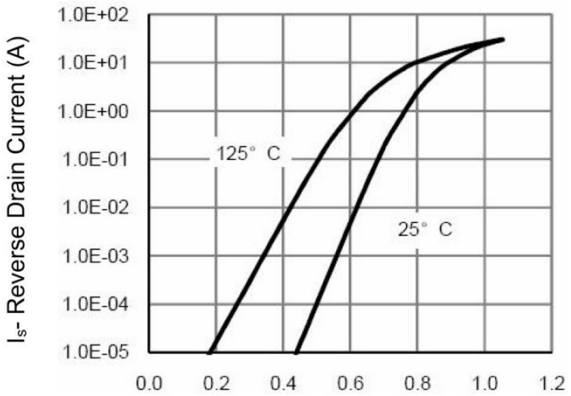


Figure 10 Source- Drain Diode Forward

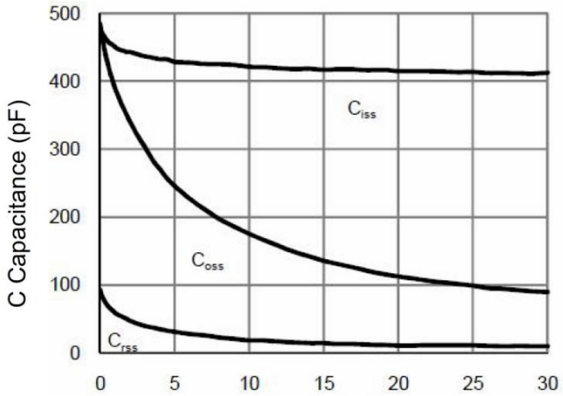


Figure 11 Capacitance vs Vds

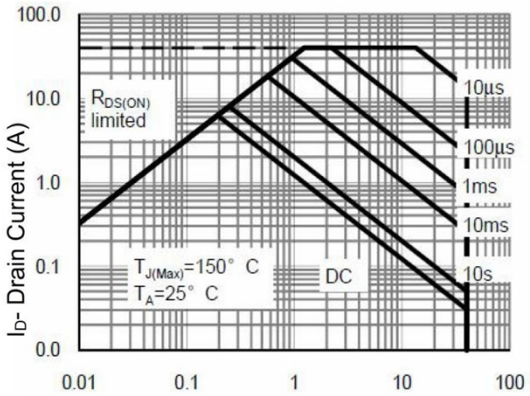


Figure 12 Safe Operation Area

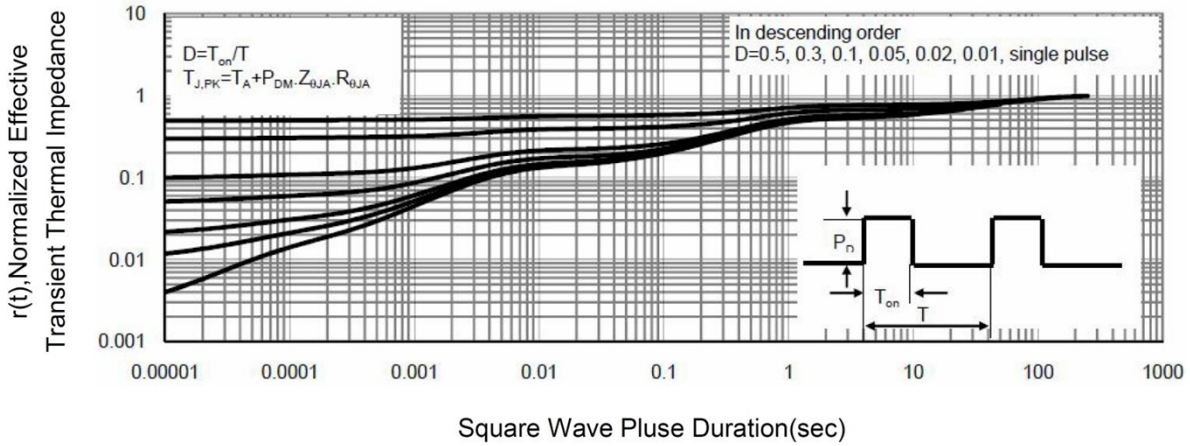


Figure 13 Normalized Maximum Transient Thermal Impedance

P-Channel Typical Characteristics

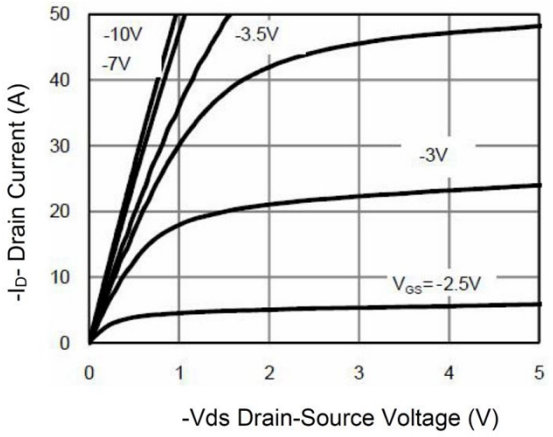


Figure 1 Output Characteristics

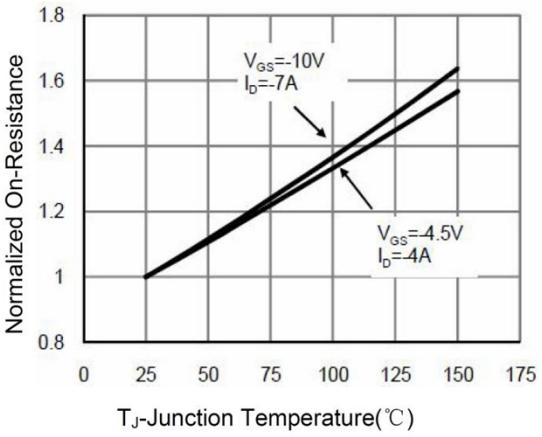


Figure 4 Rdson-Junction Temperature

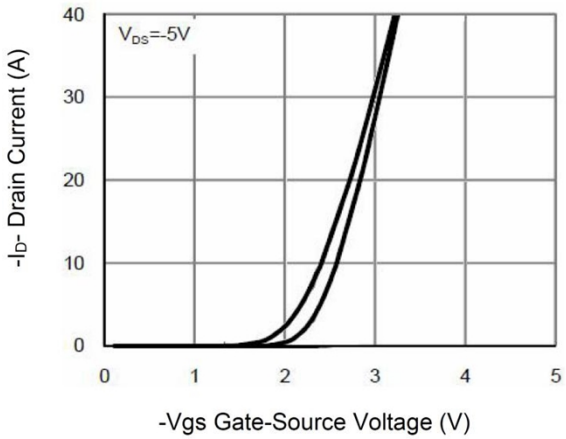


Figure 2 Transfer Characteristics

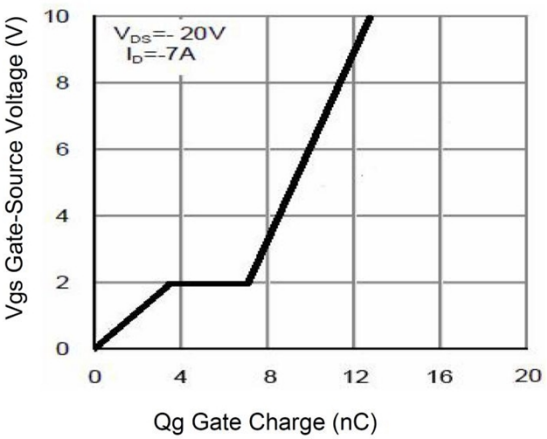


Figure 5 Gate Charge

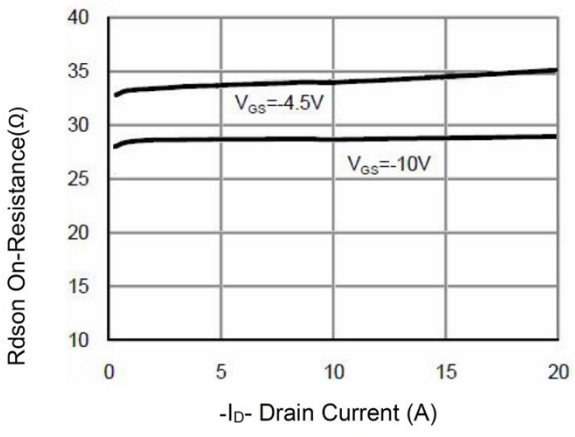


Figure 3 Rdson- Drain Current

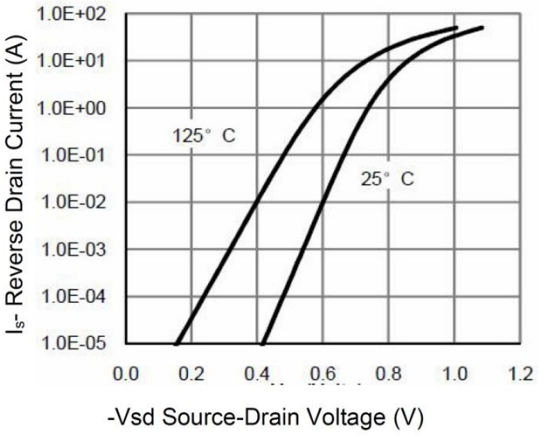


Figure 6 Source- Drain Diode Forward

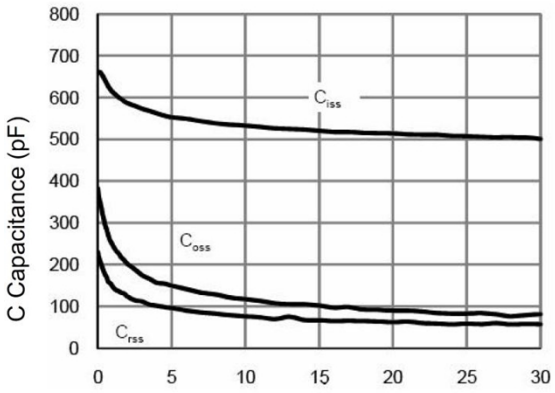


Figure 7 Capacitance vs Vds

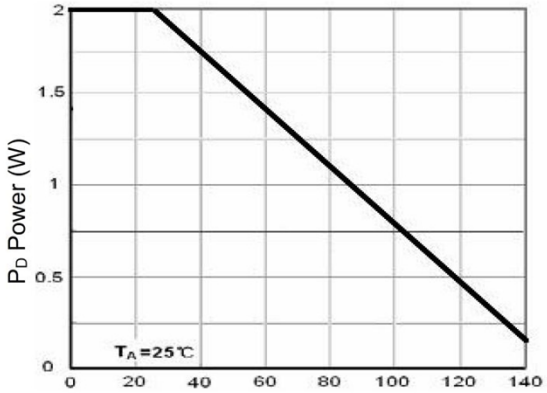


Figure 9 Power Dissipation

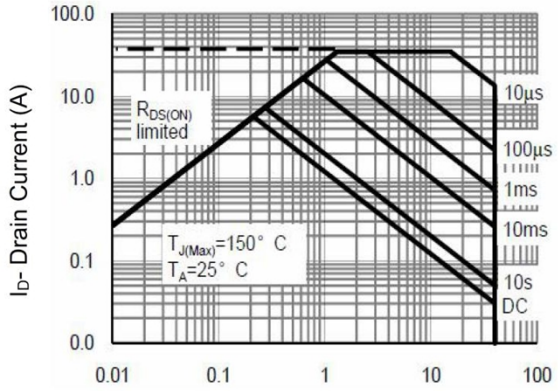


Figure 8 Safe Operation Area

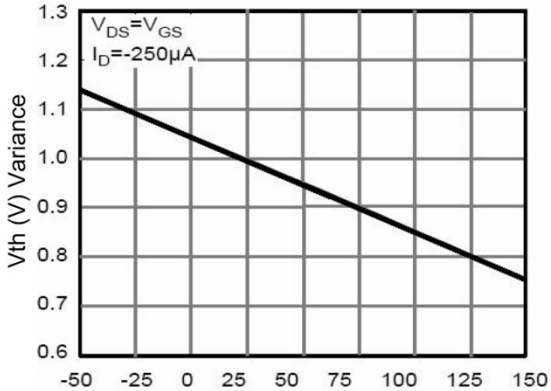


Figure 10 $V_{GS(th)}$ vs Junction Temperature

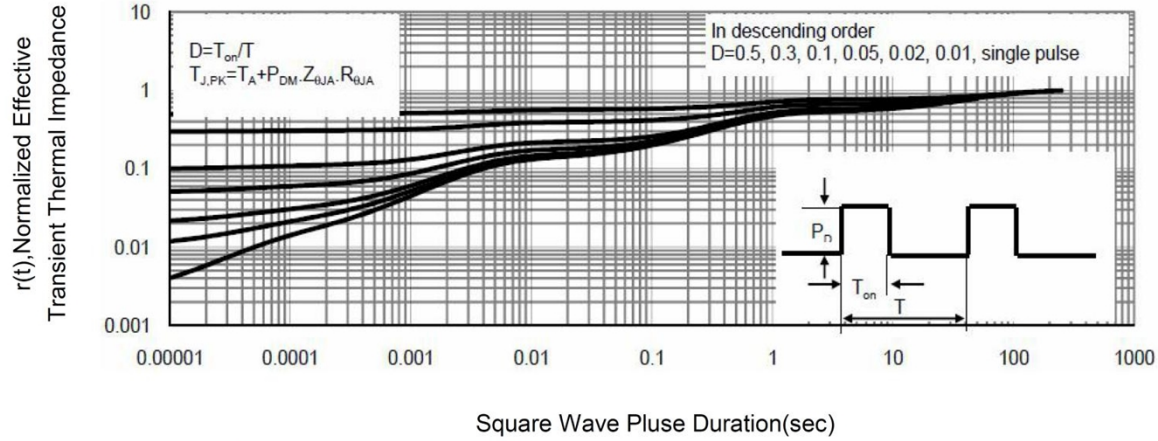
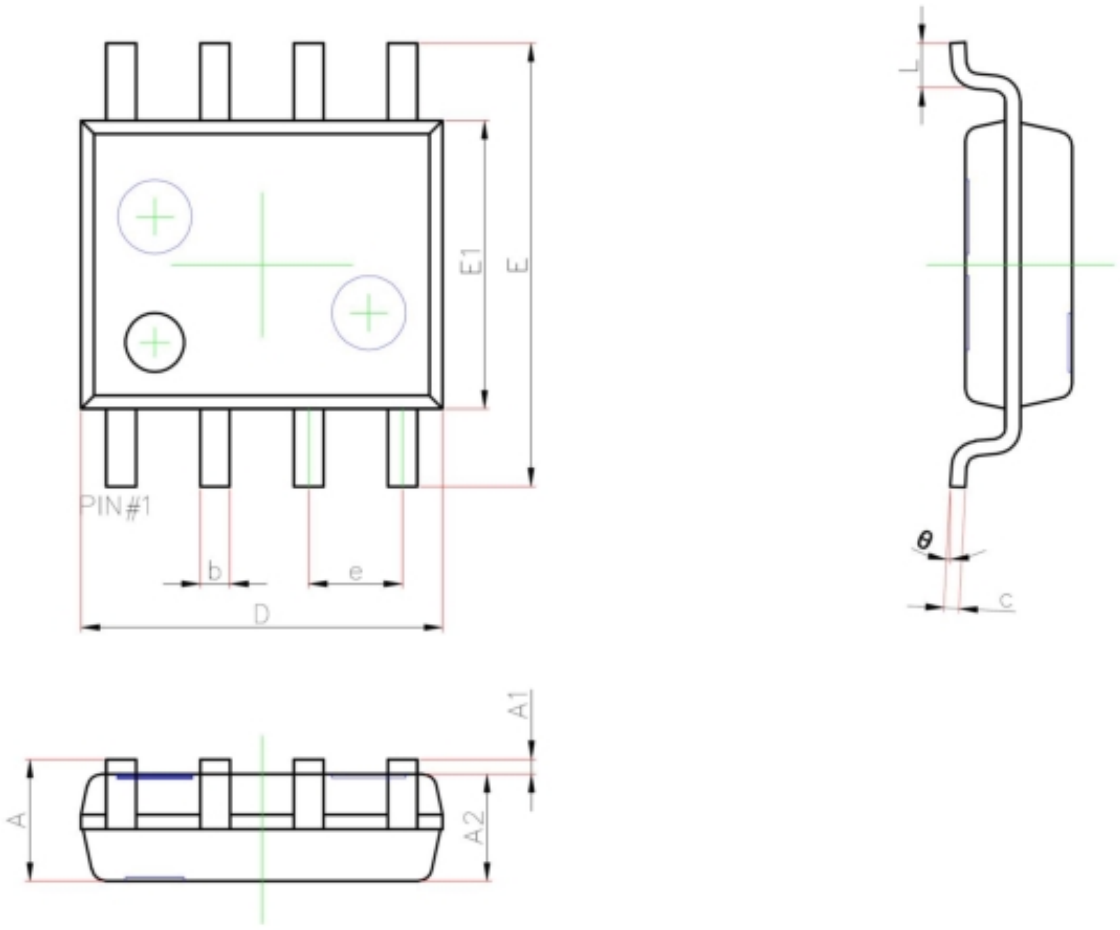


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	1.35	1.75
A1	0.10	0.25
A2	1.35	1.55
b	0.33	0.51
c	0.17	0.25
D	4.80	5.00
e	1.27 REF.	
E	5.80	6.20
E1	3.80	4.00
L	0.40	1.27
θ	0°	8°