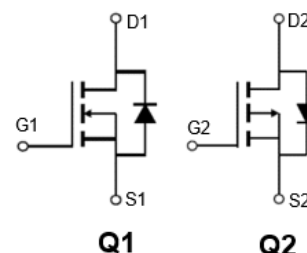
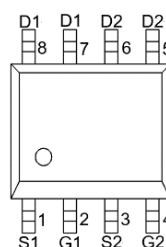
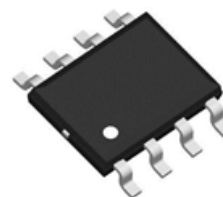


40V/-40V N and P-Channel Enhancement Mode MOSFET

Features

- Q1: $V_{DS}=40V; I_D=12A$
- Q1: $R_{DS(ON)}=28m\Omega$ (TYP.) $V_{GS}=10V, I_D=$
 $R_{DS(ON)}=32m\Omega$ (TYP.) $V_{GS}=4.5V, I_D=$
- Q2: $V_{DS}=-40V; I_D=-10A$
- Q2: $R_{DS(ON)}=42m\Omega$ (TYP.) $V_{GS}=-10V, I_D=$
 $R_{DS(ON)}=60m\Omega$ (TYP.) $V_{GS}=-4.5V, I_D=$
- Reliable and Rugged
- High Current Capability
- Low On-Resistance

SOP8



Applications

- Load Switch
- Power management in portable/desktop PCs
- DC/DC conversion

Ordering Information

Temperature Range	package		Orderable Device	Package Qty.
-55℃~+125℃	SOP8	Pb-Free	HAM4614	3000pcs/Reel

Absolute Maximum Ratings ($T_A=25^{\circ}C$, unless otherwise noted)

Parameter	Symbol	Value(Q1)	Value(Q2)	Unit
Drain-Source Voltage ($V_{GS}=0V$)	V_{DS}	40	-40	V
Gate-Source Voltage ($V_{GS}=0V$, static)	V_{GS}	± 20	± 20	V
Continuous Drain Current ($T_C=25^{\circ}C$)	I_D	12	-10	A
Continuous Drain Current ($T_C=100^{\circ}C$)		7	-6	A
Pulsed Drain Current	I_{DM}	48	-40	A
Avalanche Current	I_{AS}	12	-16	A
Single Pulsed Avalanche Energy	E_{AS}	15	21	mJ
Maximum Power Dissipation ($T_C=25^{\circ}C$)	P_D	4	4.5	W
Maximum Power Dissipation ($T_C=100^{\circ}C$)		2	2.5	W
Operating, Storage Temperature Range	T_J, T_{STG}	-55~150	-55~150	℃

Thermal Characteristics

Parameter	Symbol	Typ.	Max.	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	14	-	℃/W
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	63	-	℃/W

Q1:Electrical Characteristics

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V$	-	-	1	μA
Gate -Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.1	1.5	1.9	V
Drain-Source On-stage Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=1A$	-	28	34	m Ω
		$V_{GS}=4.5V, I_D=1A$	-	32	40	

Dynamic Characteristics

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$V_{DS}=20V$ $V_{GS}=0V$ $f=1MHz$	-	556	-	pF
Output capacitance	C_{oss}		-	82	-	
Reverse transfer capacitance	C_{rss}		-	76	-	
Gate Resistance	R_g	$f=1MHz$	-	3.9	-	Ω
Total Gate Charge	Q_g	$V_{DS}=20V$ $V_{GS}=10V$ $I_D=6A$	-	10	-	nC
Gate Source Charge	Q_{gs}		-	3.2	-	
Gate Drain Charge	Q_{gd}		-	2	-	
Turn-on delay Time	$t_{d(on)}$	$V_{GS}=10V$ $V_{DS}=20V$ $R_L=3.2\Omega$ $R_G=3\Omega$	-	5	-	ns
Rise time	t_r		-	3	-	
Turn-off delay Time	$t_{d(off)}$		-	16	-	
Fall time	t_f		-	6	-	

Reverse Diode Characteristics

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Body Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_{SD}=1A$	-	0.7	1	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_{SD}=6A$ $d_i/d_t=500A/\mu s$	-	10	-	ns
Reverse Recovery Charge	Q_{rr}		-	13	-	nC

Q1:Electrical Characteristics Diagrames

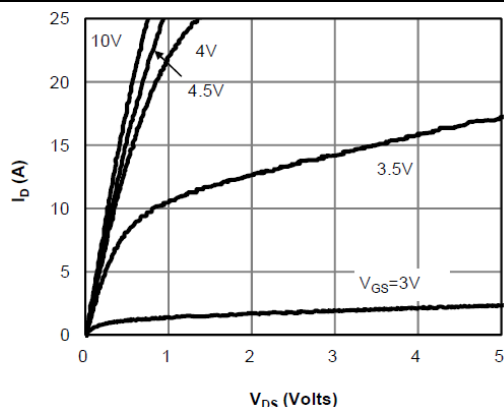
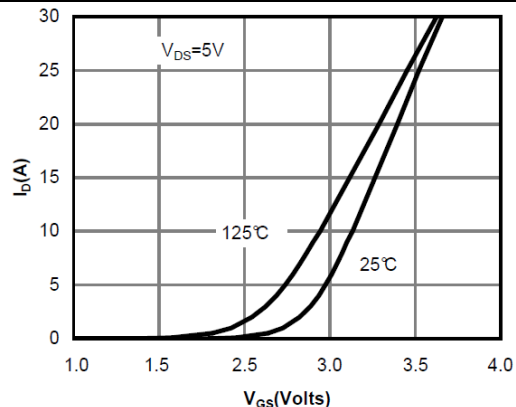
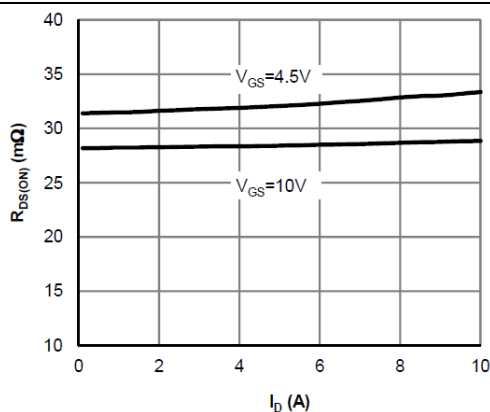
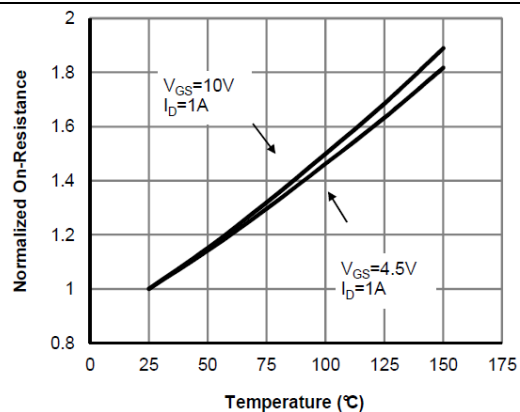
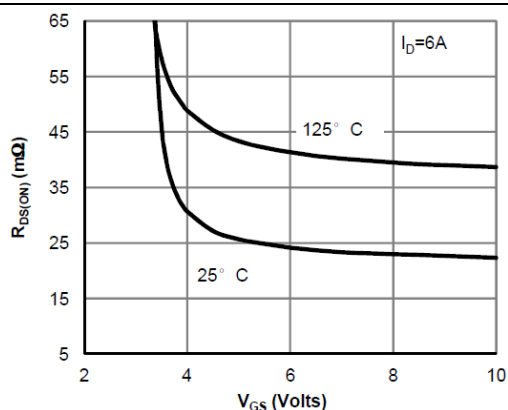
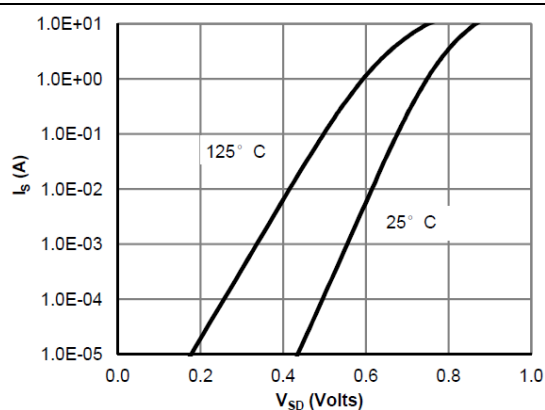
Figure 1. On-Regin Characteristics

Figure 2. Transfer Characteristics

Figure 3. On-Resistance vs. Drain Current and Gate Voltage

Figure 4. On-Resistance vs. Junction Temperature

Figure 5. On-Resistance vs. Gate-Source Voltage

Figure 6. Body-Diode Characteristics


Figure 7. Gate-Charge Characteristics

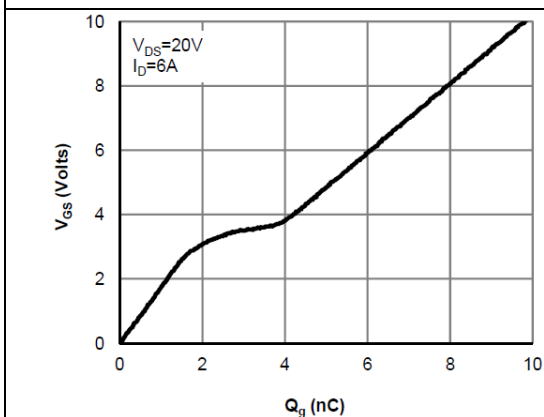


Figure 8. Capacitance Characteristics

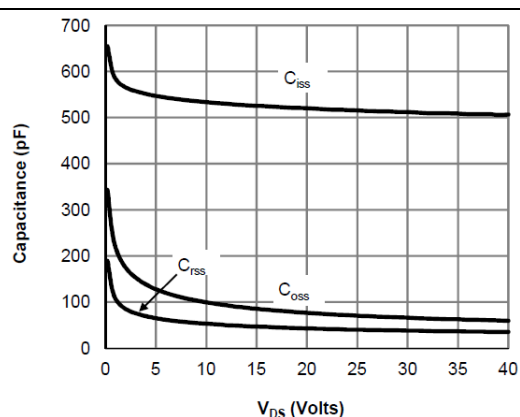


Figure 9. Maximum Forward Biased Safe Operating Area

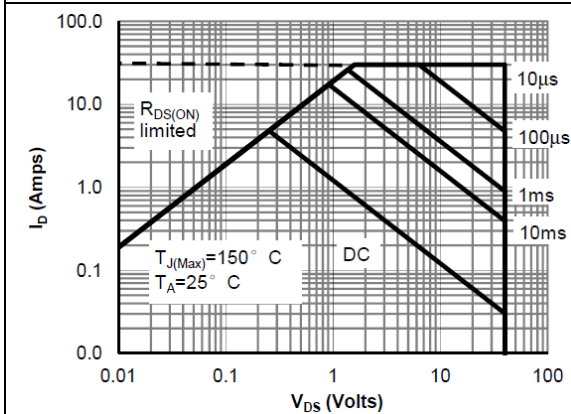


Figure 10. Single Pulse Power Rating Junction-to-Case

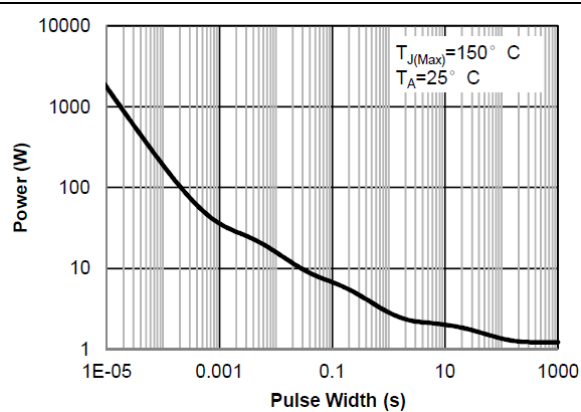
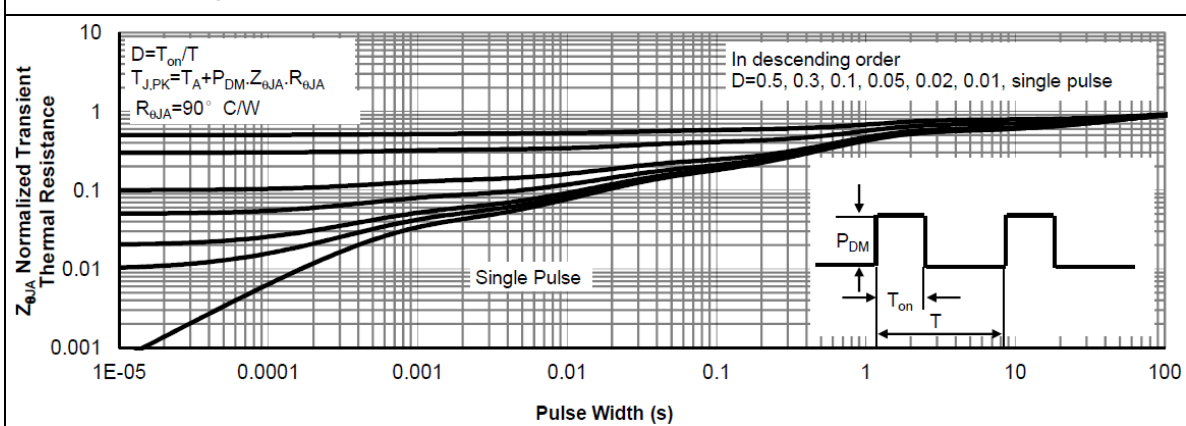


Figure 11. Normalized Maximum Transient Thermal Impedance



Q2:Electrical Characteristics

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-40V, V_{GS}=0V$	-	-	-1	μA
Gate -Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.1	-1.5	-1.9	V
Drain-Source On-stage Resistance	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-1A$	-	42	54.5	m Ω
		$V_{GS}=-4.5V, I_D=-1A$	-	60	78	

Dynamic Characteristics

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Input capacitance	C_{iss}	$V_{DS}=-20V$ $V_{GS}=0V$ $f=1MHz$	-	980	-	pF
Output capacitance	C_{oss}		-	92	-	
Reverse transfer capacitance	C_{rss}		-	75	-	
Gate Resistance	R_g	$f=1MHz$	-	8.9	-	Ω
Total Gate Charge	Q_g	$V_{DS}=-20V$ $V_{GS}=-10V$ $I_D=-5A$	-	17	-	nC
Gate Source Charge	Q_{gs}		-	3.5	-	
Gate Drain Charge	Q_{gd}		-	3	-	
Turn-on delay Time	$t_{d(on)}$	$V_{GS}=-10V$ $V_{DS}=-20V$ $R_L=4\Omega$ $R_G=3\Omega$	-	6.5	-	ns
Rise time	t_r		-	7.8	-	
Turn-off delay Time	$t_{d(off)}$		-	45	-	
Fall time	t_f		-	40	-	

Reverse Diode Characteristics

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Body Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_{SD}=-1A$	-	-0.7	-1	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_{SD}=-5A$ $d_i/d_t=500A/\mu s$	-	22	-	ns
Reverse Recovery Charge	Q_{rr}		-	15	-	nC

Q2:Electrical Characteristics Diagrames

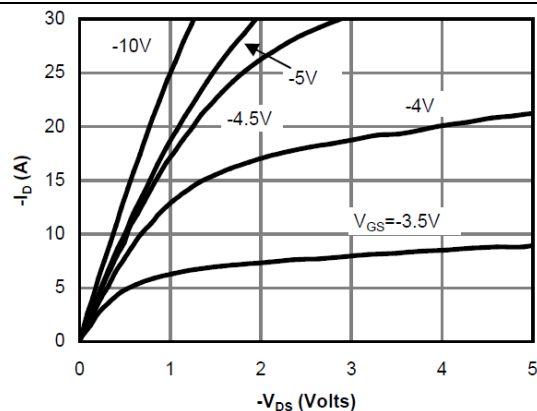
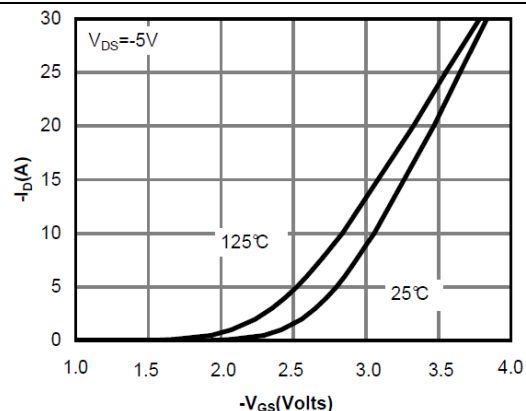
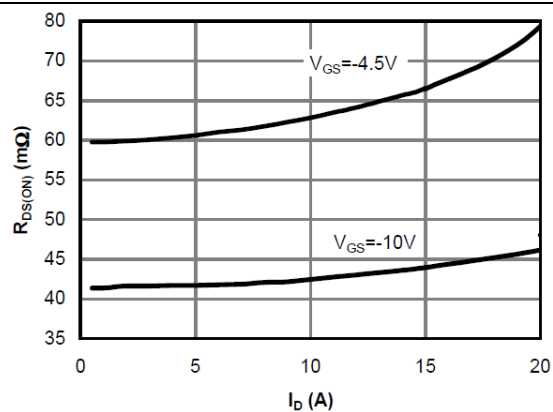
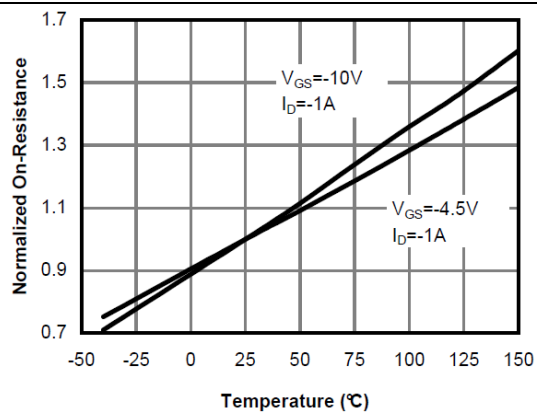
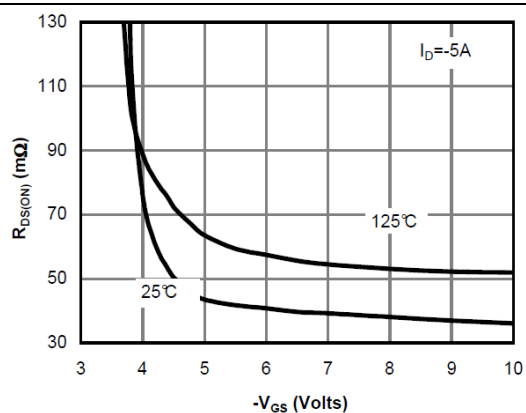
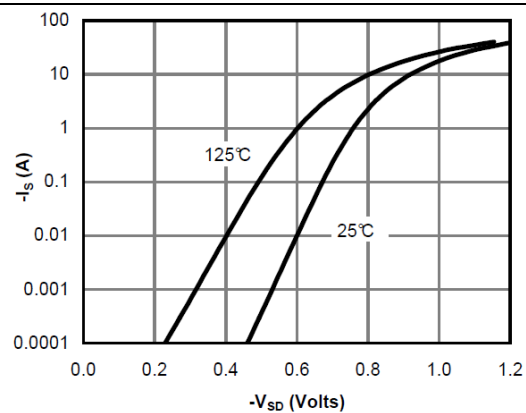
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Figure 2. Transfer Characteristics

Figure 3. On-Resistance vs. Drain Current and Gate Voltage

Figure 4. On-Resistance vs. Junction Temperature

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Figure 7. Gate-Charge Characteristics

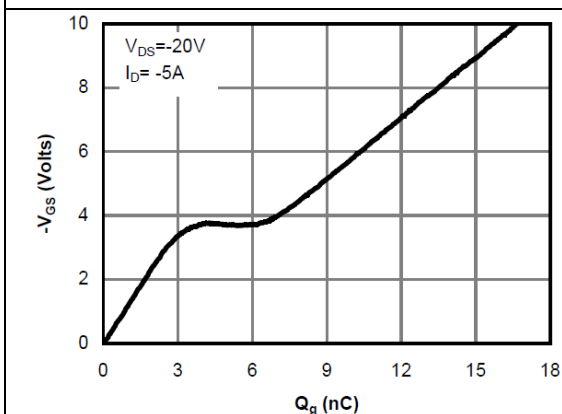


Figure 8. Capacitance Characteristics

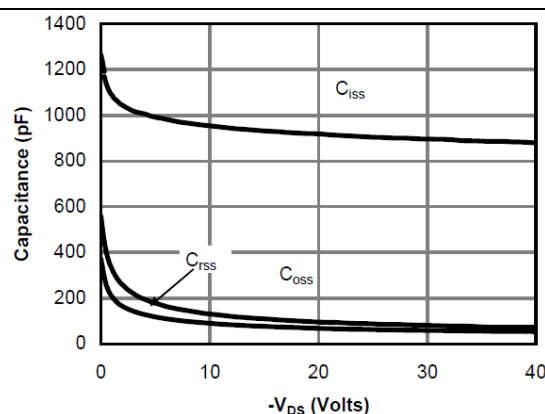


Figure 9. Maximum Forward Biased Safe Operating Area

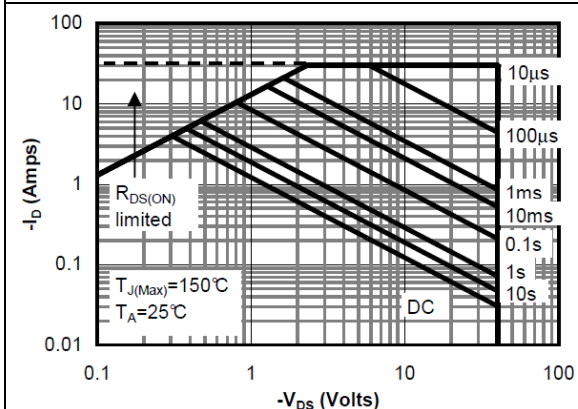


Figure 10. Single Pulse Power Rating Junction-to-Case

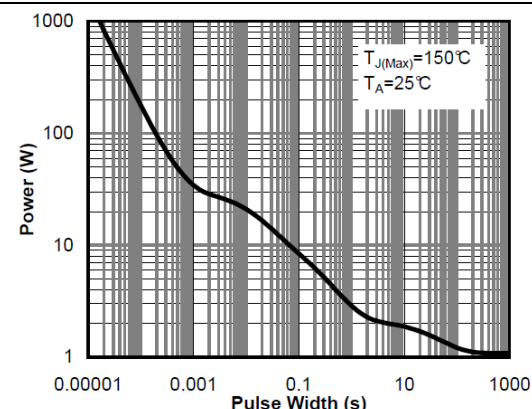
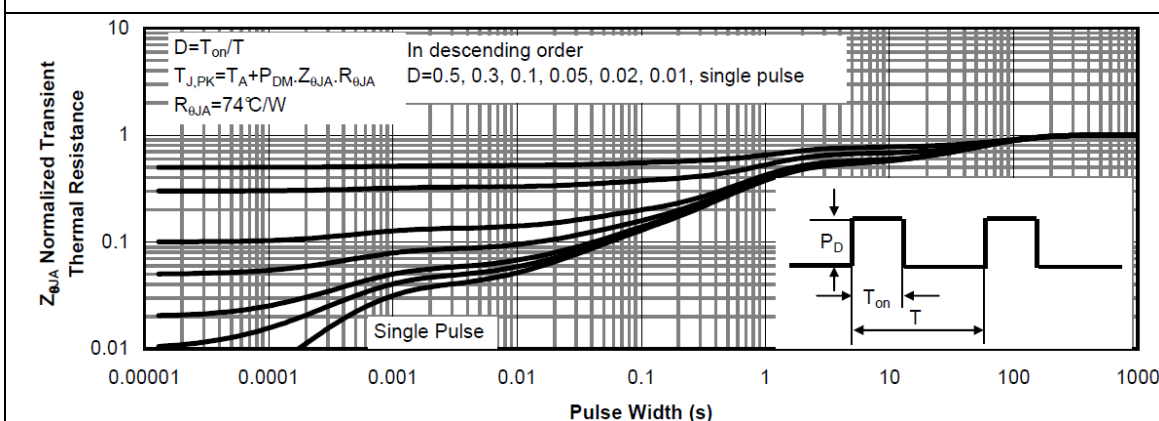
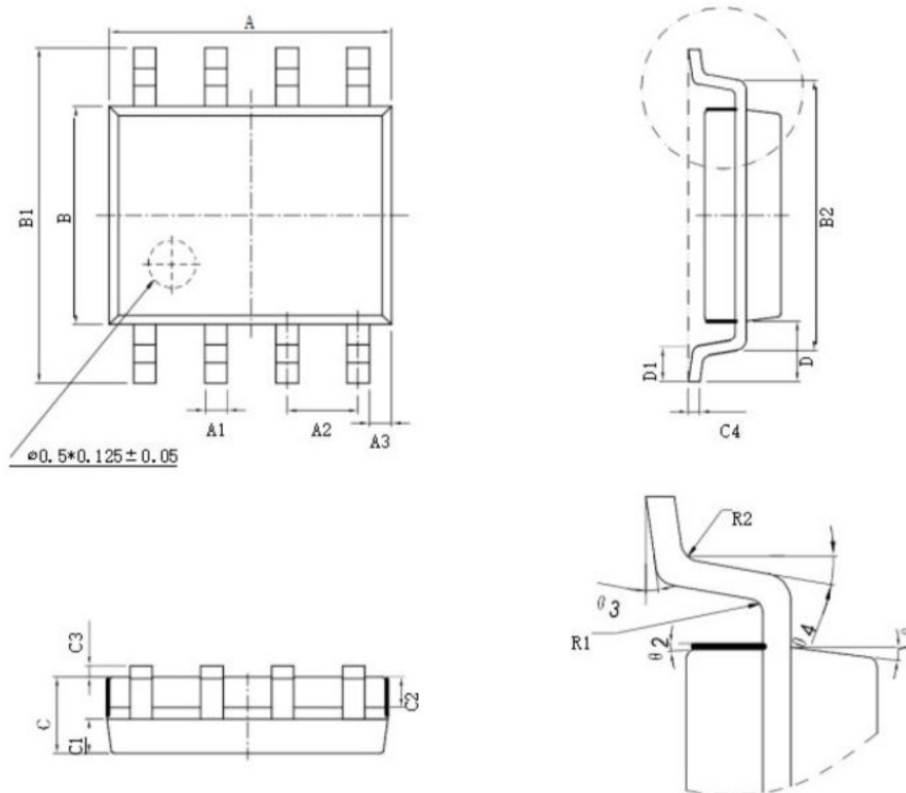


Figure 11. Normalized Maximum Transient Thermal Impedance



Physical Dimensions

SOP8



符号	尺寸 (mm)		符号	尺寸 (mm)	
	最小值	最大值		最小值	最大值
A	4.80	5.00	C3	0.05	0.20
A1	0.356	0.456	C4	0.203	0.233
A2	1.27 TYP		D	1.05 TYP	
A3	0.345 TYP		D1	0.40	0.80
B	3.80	4.00	R1	0.20 TYP	
B1	5.80	6.20	R2	0.20 TYP	
B2	5.00 TYP		$\theta 1$	17° TYP4	
C	1.30	1.60	$\theta 2$	13° TYP4	
C1	0.55	0.65	$\theta 3$	0° ~ 8°	
C2	0.55	0.65	$\theta 4$	4° ~ 12°	

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