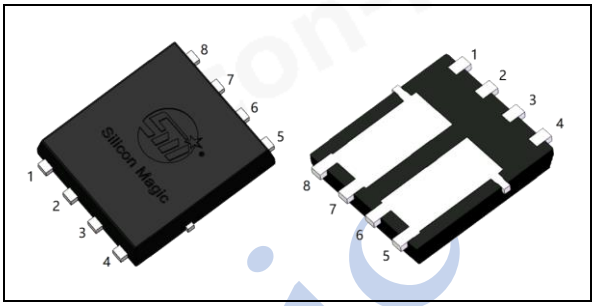
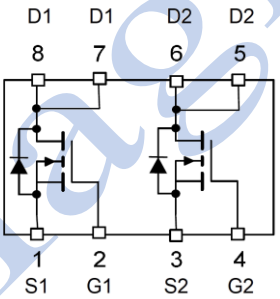
N-Channel 40V MOSFET

Product summary

V_{DS} (V)	$R_{DS(on),max}$ (mΩ)	I_D (A)
40	7.2 @ V_{GS} = 10V	23 (1)

PDFN5*6-D





Features

- For automotive applications and AEC-Q101 qualified
- Low FOM and thermal impedance
- Fast switching speed
- 100% avalanche tested

Applications

- DC/DC conversion
- Power switch
- Motor drives

Pb-free
RoHS COMPLIANT
HALOGEN FREE

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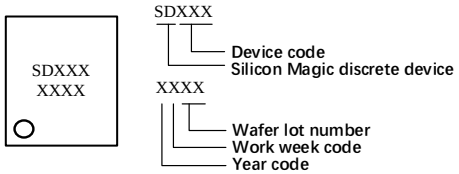


Package and ordering information

Ordering code	Package	Device code
SDA04K006N-AA	PDFN5*6-D	AKS

1. Maximum ratings

Absolute maximum ratings (T_A = 25℃ unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-source voltage		V_{DS}	40	V
Gate-source voltage		V_{GS}	±20	
Continuous drain current	T_C=25℃ (1)	I_D	23	A
	T_C=100℃		23	
	T_A=25℃ (4)		13	
Pulsed drain current(2)		$I_{D,pulse}$	92	
Avalanche energy, single pulse(3)		E_{AS}	20	mJ
Power dissipation	T_C=25℃	P_D	25	W
	T_A=25℃ (4)		2.1	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to 175	℃

2. Thermal resistance ratings

Thermal resistance ratings				
Parameter		**Symbol**	**Max.**	**Unit**
Thermal resistance, junction-to-case	Steady state	$R_{\theta JC}$	6	℃/W
Thermal resistance, junction-to-ambient (4)	Steady state	$R_{\theta JA}$	70	

3. Electrical Characteristics

Electrical characteristics (T_J = 25℃ unless otherwise noted)						
Parameter	**Symbol**	**Test conditions**	**Min.**	**Typ.**	**Max.**	**Unit**
Static parameter						
Drain to source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 1 mA	40			V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	1.2	1.8	2.4	V
Gate-body leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero gate voltage drain current	I_{DSS}	V_{DS} = 40 V, V_{GS} = 0 V			1	μA
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 10 A		6	7.2	mΩ
		V_{GS} = 4.5 V, I_D = 5 A		8.8	12	
Forward transconductance(5)	g_{fs}	V_{DS} = 5 V, I_D = 20 A		30		S
Gate resistance	R_g	f = 1 MHz		2.5		Ω
Dynamic(5)						
Total gate charge	Q_g	V_{DS} = 20 V, I_D = 5 A, V_{GS} = 4.5 V		8		nC
Total gate charge	Q_g	V_{DS} = 20 V, I_D = 10 A, V_{GS} = 10 V		15		
Gate-source charge	Q_{gs}			2.8		
Gate-drain charge	Q_{gd}			3.7		
Turn-on delay time	$t_{d(on)}$	V_{DS} = 20 V, I_D =10 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		11		ns
Rise time	t_r			14		
Turn-off delay time	$t_{d(off)}$			20		
Fall time	t_f			14		
Input capacitance	C_{iss}	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz		910		pF
Output capacitance	C_{oss}			390		
Reverse transfer capacitance	C_{rss}			18		
Reverse Diode Characteristics(5)						
Diode forward voltage	V_{SD}	V_{GS} = 0 V, I_F = 10 A		0.8	1.1	V
Reverse recovery time	t_{rr}	V_{DS} = 20 V, I_F = 10 A, di/dt = 100 A/μs		28		ns
Reverse recovery charge	Q_{rr}			14		nC

Notes

(1) Package Limited.

(2) Pulse width limited by Package.

(3) V_{DS} = 20 V, V_{GS} = 10 V, L = 0.3 mH.

(4) $R_{\theta JA}$ is determined with the device mounted on a 1 in^2 pad 2 oz copper pad on a 1.5x1.5 in. board of FR-4 material.

(5) Guaranteed by design, not subject to production testing.

4. Electrical characteristics diagrams

Fig.1 Typ. transfer characteristics

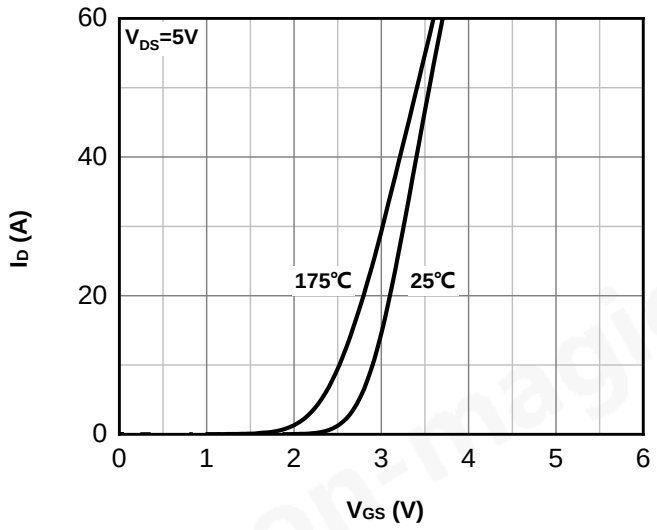


Fig.2 Typ. output characteristics

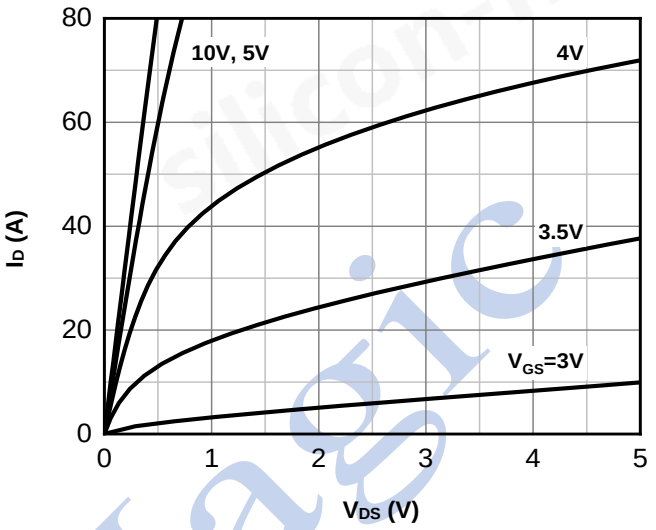


Fig.3 Normalized on-resistance vs drain current

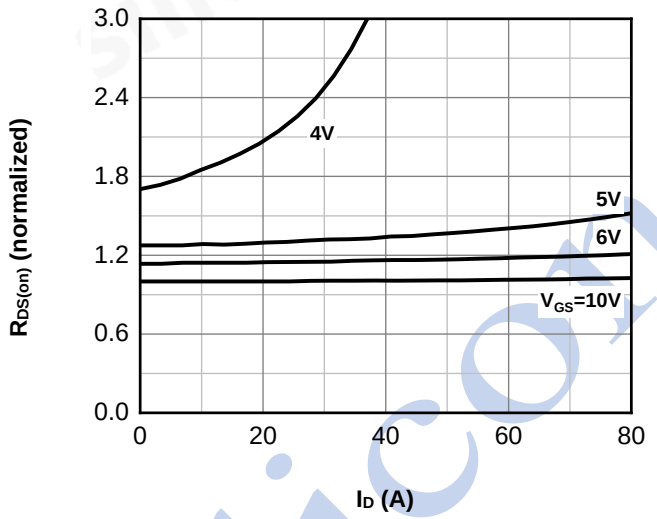


Fig.4 Typ. on-resistance vs gate-source voltage

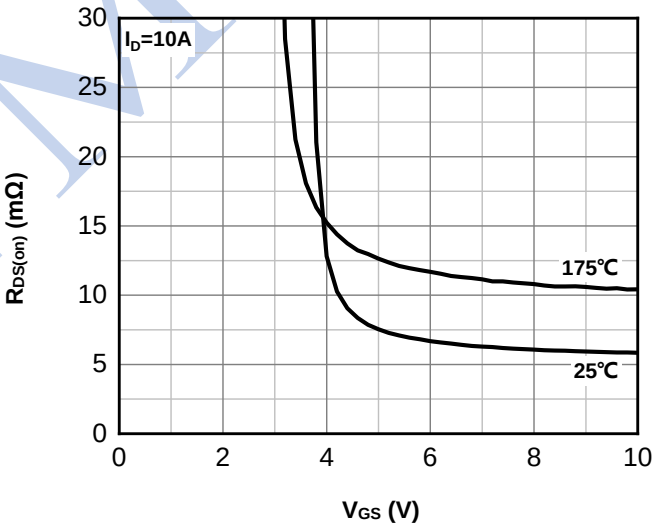


Fig.5 Normalized on-resistance vs junction temperature

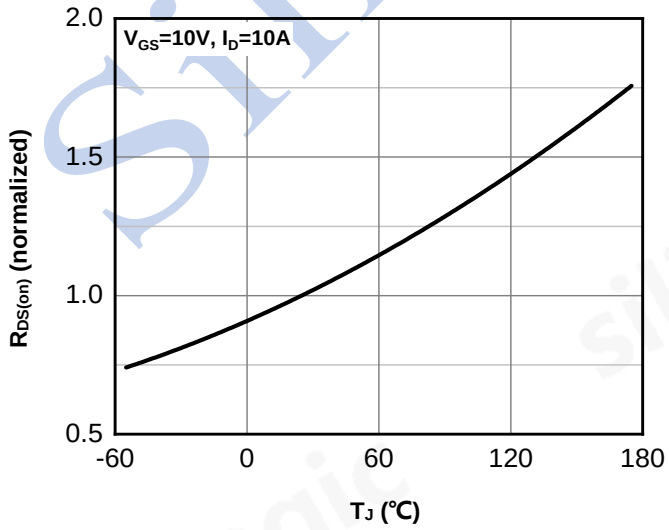


Fig.6 Typ. gate charge

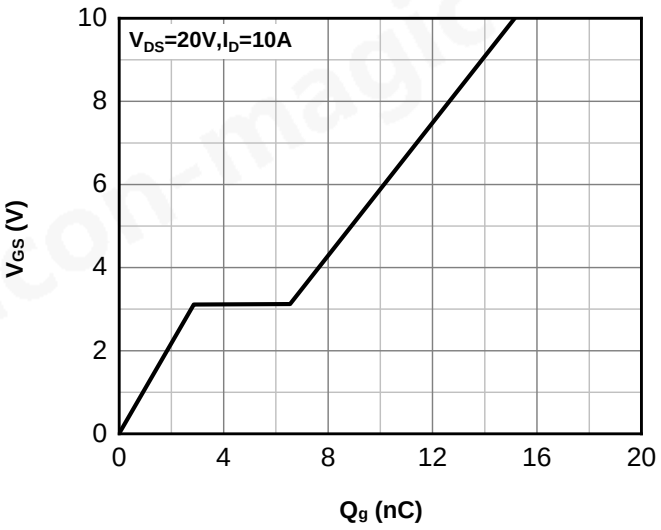


Fig.7 Typ. forward characteristics of body diode

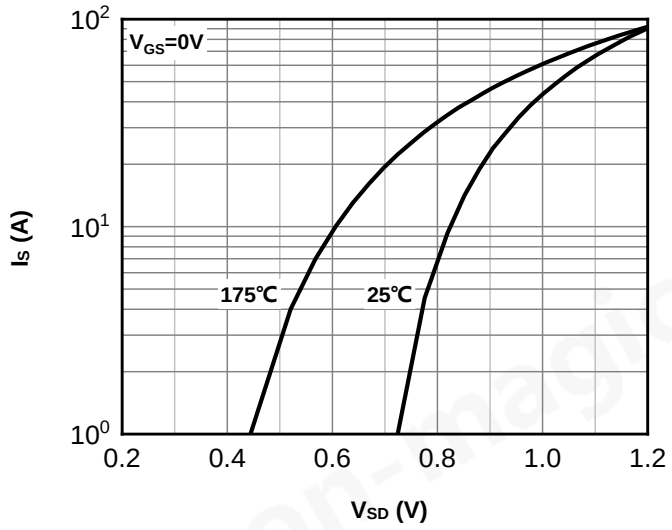


Fig.8 Safe operating area

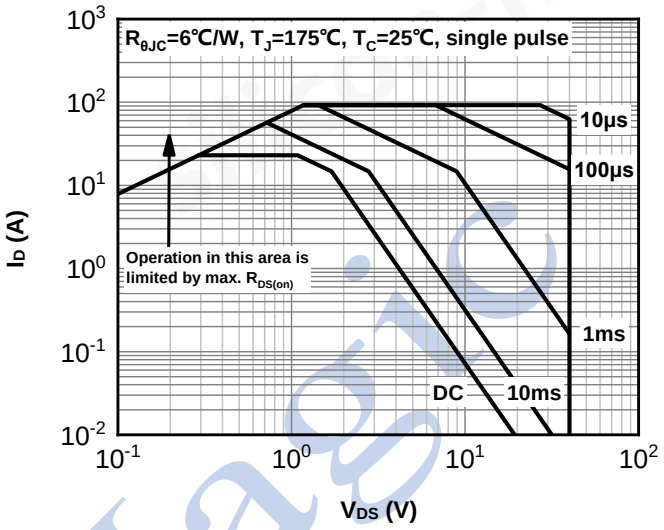


Fig.9 Typ. Capacitance

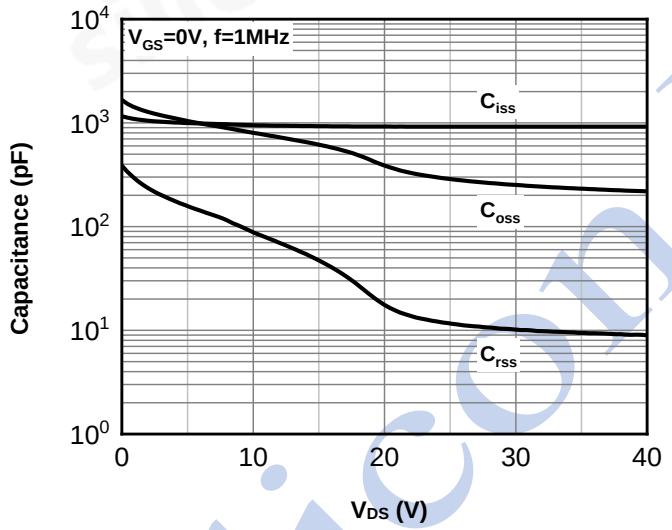


Fig.10 Single pulse maximum power dissipation

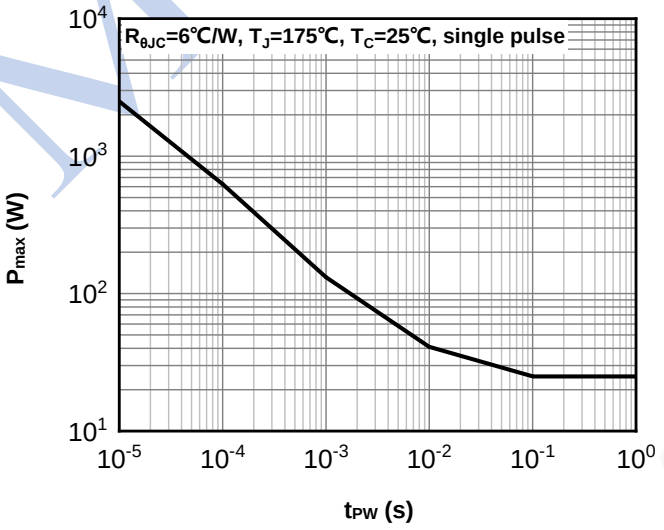


Fig.11 Max. power dissipation vs case temperature

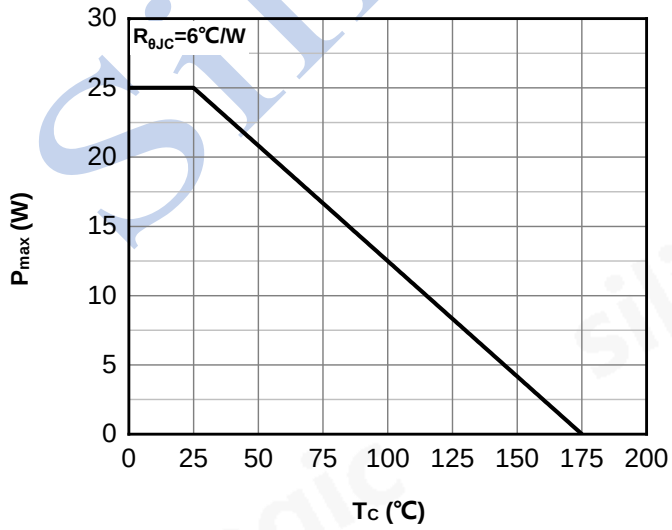


Fig.12 Max. continuous drain current vs case temperature

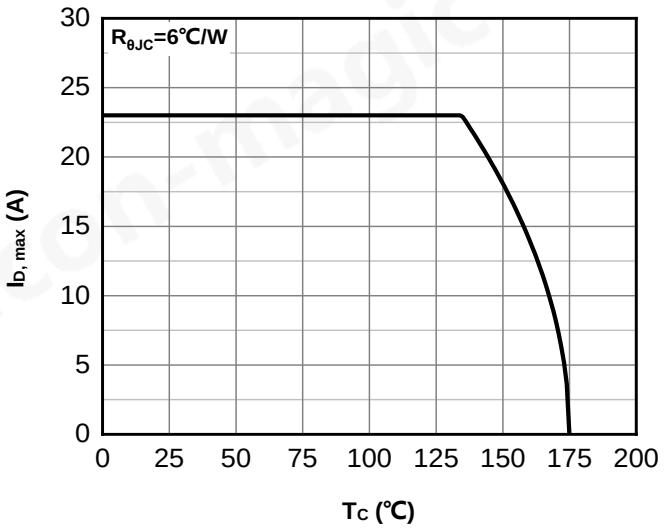


Fig.13 Normalized $V_{(BR)DSS}$ vs junction temperature

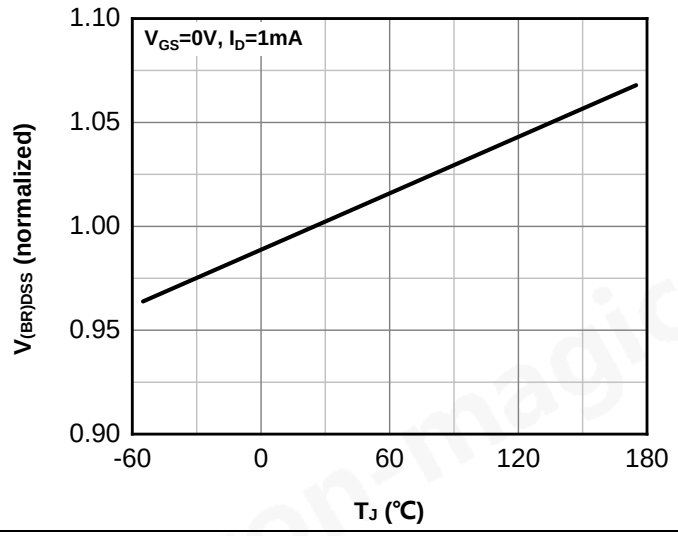


Fig.14 Normalized $V_{GS(th)}$ vs junction temperature

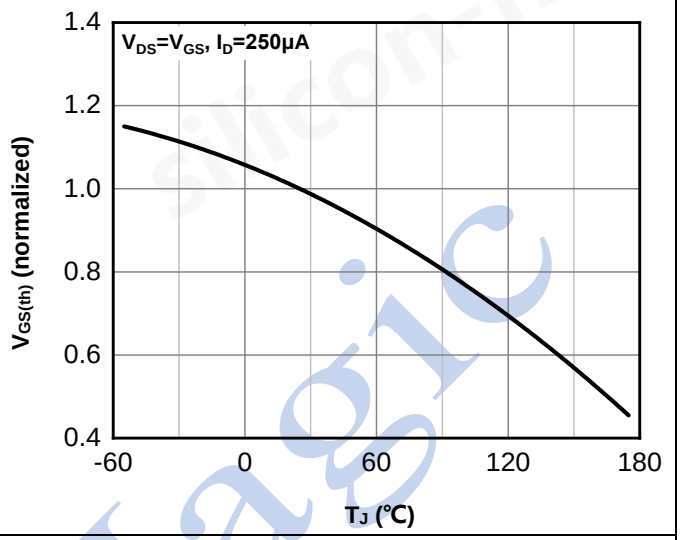
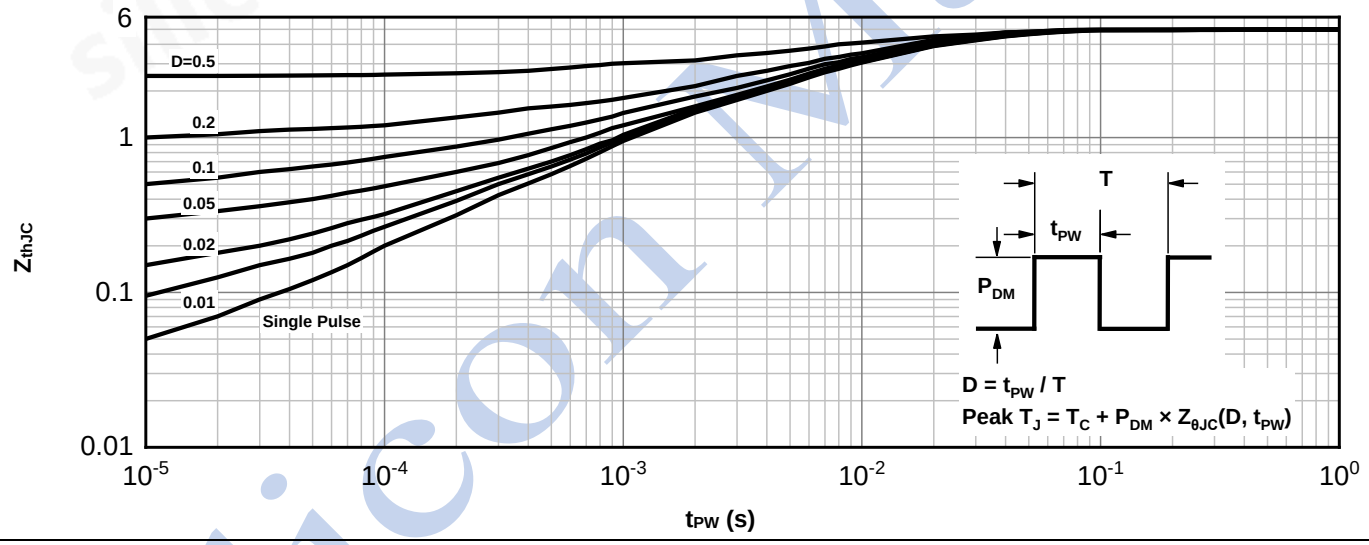
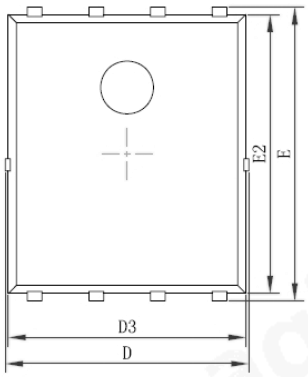
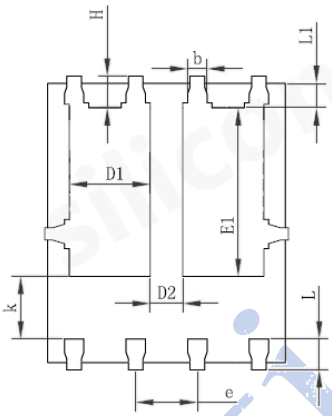


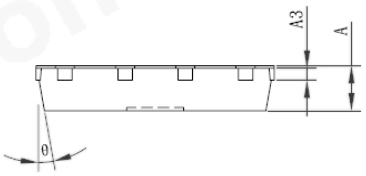
Fig.15 Transient thermal impedance from junction to case



5. Package outline dimensions







Dim	Millimeters		
	Min	Nom	Max
A	0.900	-	1.000
A3	0.254 REF		
D	4.944	-	5.096
E	5.974	-	6.126
D1	1.470	-	1.870
D2	0.470	-	0.870
E1	3.375	-	3.575
D3	4.824	-	4.976
E2	5.674	-	5.826
k	1.190	-	1.390
b	0.350	-	0.450
e	1.270 TYP		
L	0.559	-	0.711
L1	0.424	-	0.576
H	0.574	-	0.726
θ	10°	-	12°

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