

N-Channel 60 V MOSFET

Product summary

V_{DS} (V)	$R_{DS(on),max}$ (m Ω)	I_D (A)
60	9.5 @ $V_{GS} = 10V$	46 ⁽¹⁾

Features

- For automotive applications and AEC-Q101 qualified
- Great FOM (figure of merit) with low $R_{DS(on)}$ SGT technology
- Fast switching speed
- 100% avalanche tested. High avalanche ruggedness.

Applications

- DC/DC conversion
- Power switch
- Motor drives

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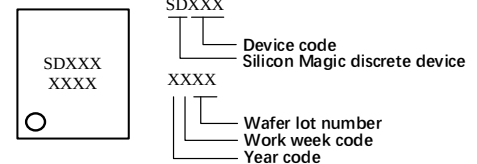
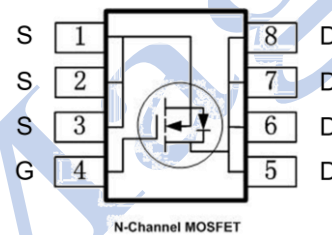
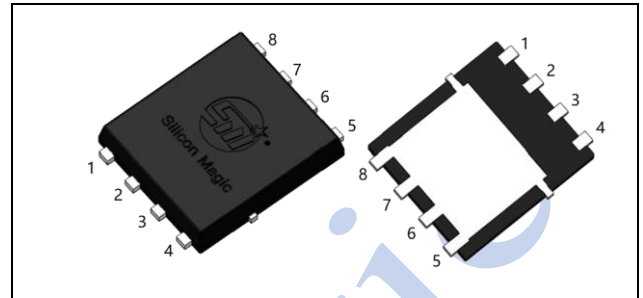
Package and ordering information

Ordering code	Package	Device code
SDA06K9P5C-AA	PDFN5X6-8L	ALQ

1. Maximum ratings

Absolute maximum ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)				
Parameter		Symbol	Limit	Unit
Drain-source voltage		V_{DS}	60	V
Gate-source voltage		V_{GS}	± 20	
Continuous drain current	$T_C = 25^\circ\text{C}$ ⁽¹⁾	I_D	46	A
	$T_C = 100^\circ\text{C}$		33	
	$T_A = 25^\circ\text{C}$ ⁽⁴⁾		12	
Pulsed drain current ⁽²⁾		$I_{D,pulse}$	187	
Avalanche energy, single pulse ⁽³⁾		E_{AS}	20	mJ
Power dissipation	$T_C = 25^\circ\text{C}$	P_D	42.8	W
	$T_A = 25^\circ\text{C}$ ⁽⁴⁾		3	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

PDFN5X6-8L



2. Thermal resistance ratings

Thermal resistance ratings				
Parameter		Symbol	Max.	Unit
Thermal resistance, junction-to-case	Steady state	$R_{\theta JC}$	3.5	°C/W
Thermal resistance, junction-to-ambient ⁽⁴⁾	Steady state	$R_{\theta JA}$	50	

3. Electrical Characteristics

Electrical characteristics (T _J = 25°C unless otherwise noted)						
Parameter	Symbol	Test conditions	Min.	Typ.	Max.	Unit
Static parameter						
Drain to source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0, I _D = 250 μA	60			V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.2	1.9	2.6	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} = 60 V, V _{GS} = 0 V			1	μA
Drain-source on-resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 20 A		6.7	9.5	mΩ
		V _{GS} = 4.5 V, I _D = 10 A		10.8	16	
Forward transconductance ⁽⁵⁾	g _{fs}	V _{DS} = 5 V, I _D = 20 A		40		S
Gate resistance	R _g	f = 1MHz		2.5		Ω
Dynamic ⁽⁵⁾						
Total gate charge	Q _g	V _{DS} = 30 V, I _D = 10 A, V _{GS} = 4.5 V		11		nC
Total gate charge	Q _g	V _{DS} = 30 V, I _D = 20 A, V _{GS} = 10 V		19.5		
Gate-source charge	Q _{gs}			3.5		
Gate-drain charge	Q _{gd}			6		
Turn-on delay time	t _{d(on)}	V _{DS} = 30 V, I _D = 20 A, V _{GS} = 10 V, R _{GEN} = 6 Ω		15		ns
Rise time	t _r			40		
Turn-off delay time	t _{d(off)}			38		
Fall time	t _f			15		
Input capacitance	C _{iss}	V _{DS} = 30 V, V _{GS} = 0 V, f = 1 MHz		895		pF
Output capacitance	C _{oss}			300		
Reverse transfer capacitance	C _{rss}			25		
Reverse Diode Characteristics ⁽⁵⁾						
Diode forward voltage	V _{SD}	V _{GS} = 0 V, I _F = 20 A		0.9	1.2	V
Reverse recovery time	t _{rr}	V _{DS} = 30 V, I _F = 20 A, di/dt = 100 A/μs		28		ns
Reverse recovery charge	Q _{rr}			15		nC

Notes

- (1) Limited by maximum junction temperature.
- (2) Pulse width limited by maximum junction temperature.
- (3) $V_{DS} = 30 \text{ V}, V_{GS} = 10 \text{ V}, L = 0.3 \text{ mH}$.
- (4) $R_{\theta JA}$ is determined with the device mounted on a 1 in² 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

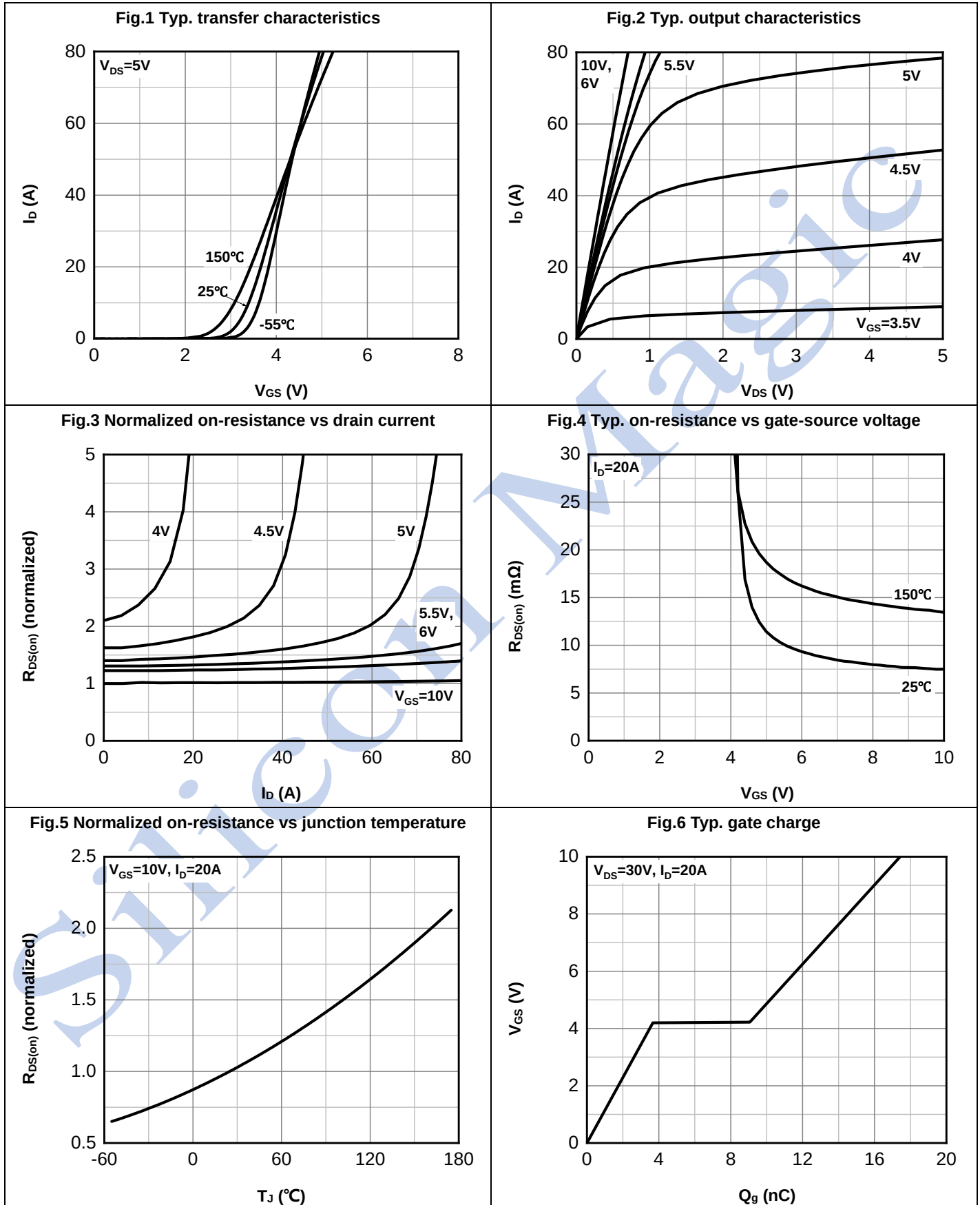


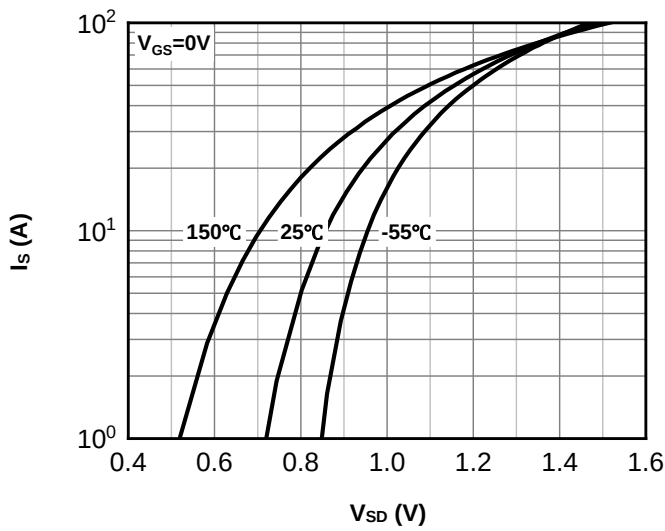
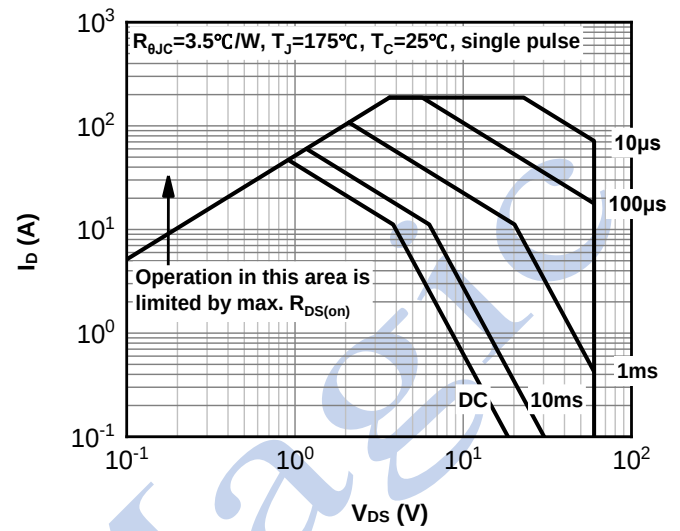
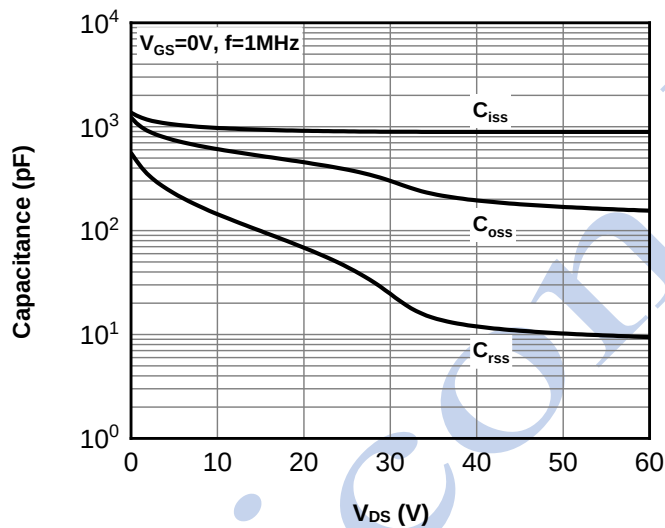
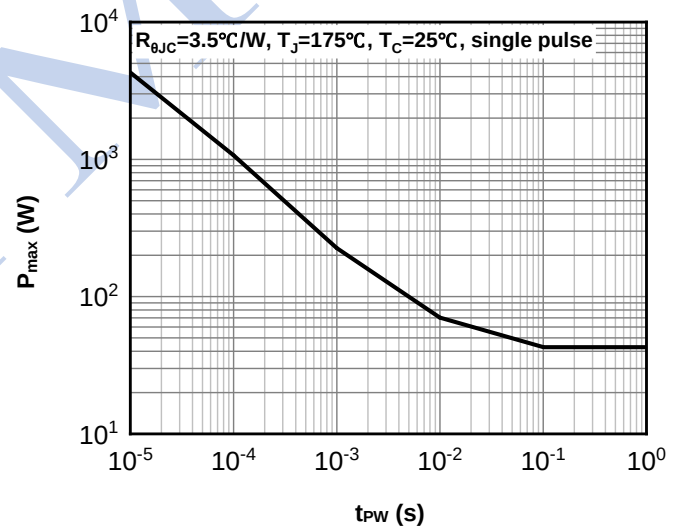
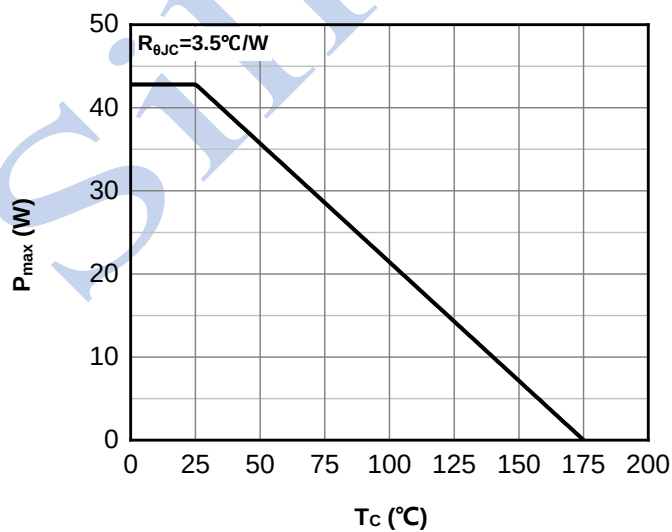
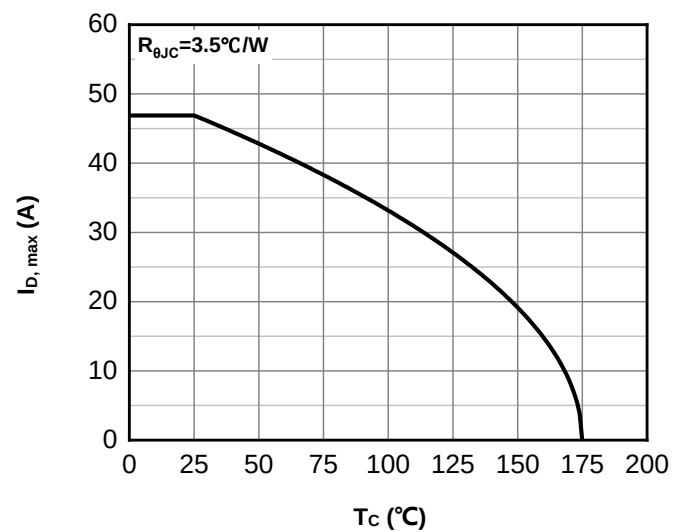
Fig.7 Typ. forward characteristics of body diode

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

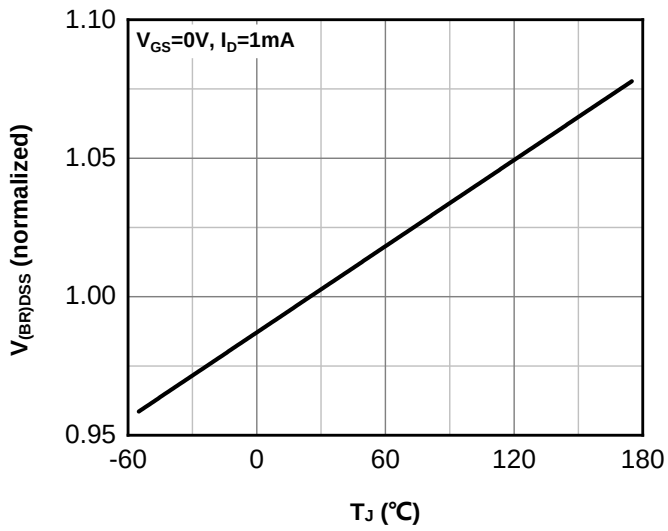


Fig.14 Normalized $V_{GS(th)}$ vs junction temperature

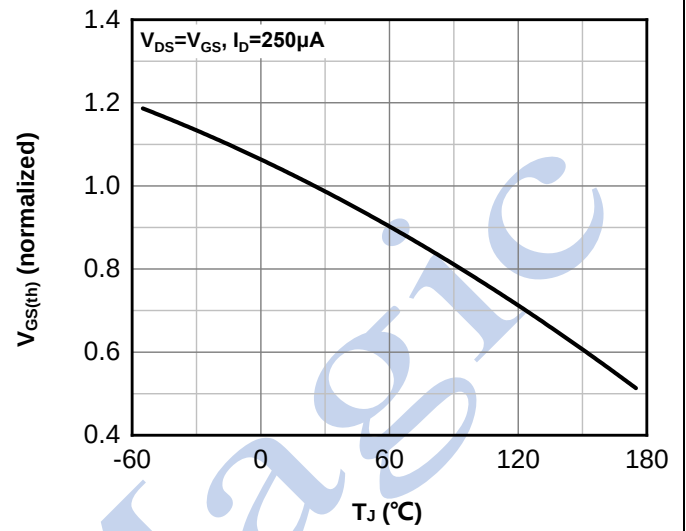
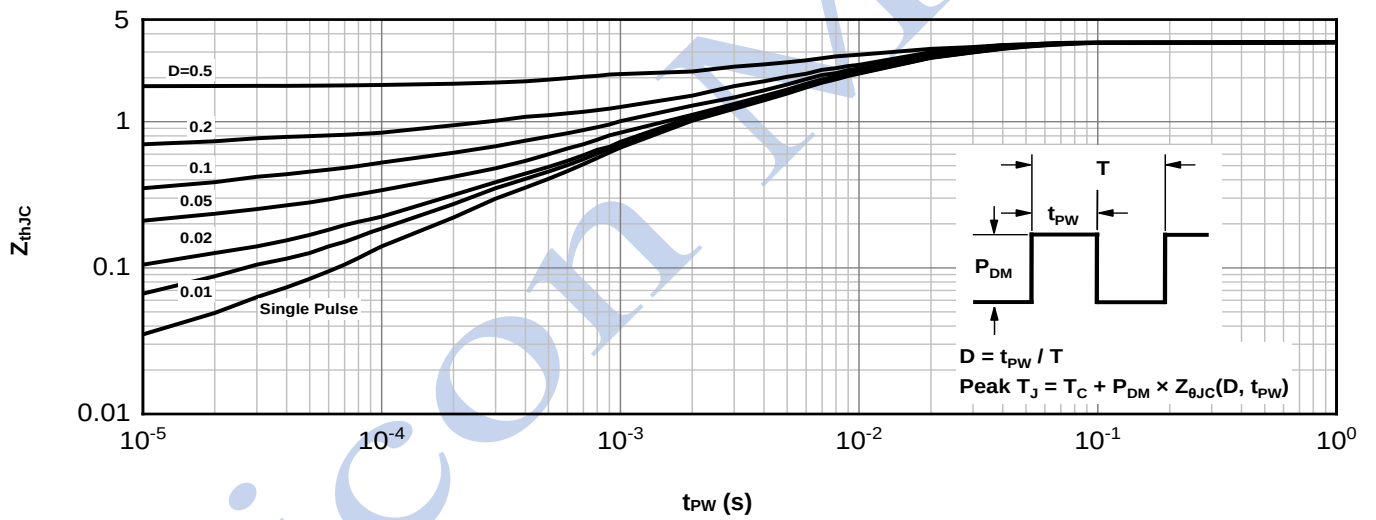
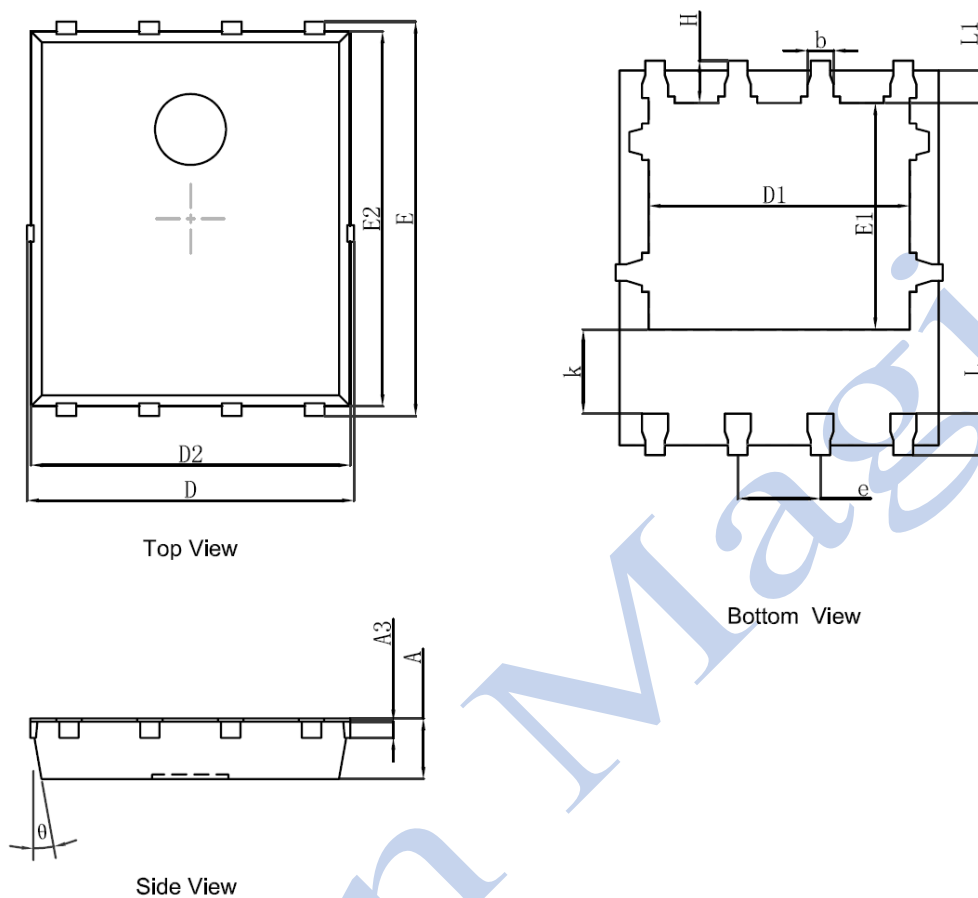


Fig.15 Transient thermal impedance from junction to case



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	3.910	-	4.110
E1	3.375	-	3.575
D2	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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