

N-Channel 40V MOSFET

Product summary

V_{DS} (V)	$R_{DS(on),max}$ (m Ω)	I_D (A)
40	1.1 @ $V_{GS} = 10V$	299 ⁽¹⁾

Features

- For automotive applications and AEC-Q101 qualified
- Low $R_{DS(on)}$ trench technology
- Fast switching speed
- 100% avalanche tested

Applications

- DC/DC conversion
- Power switch
- Motor drives

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Package and ordering information

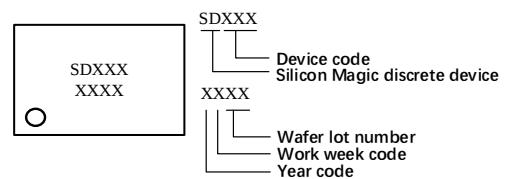
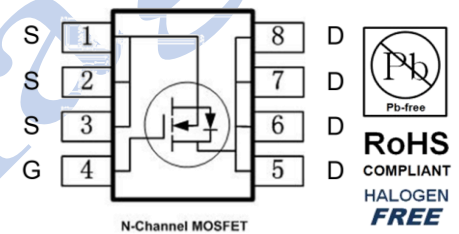
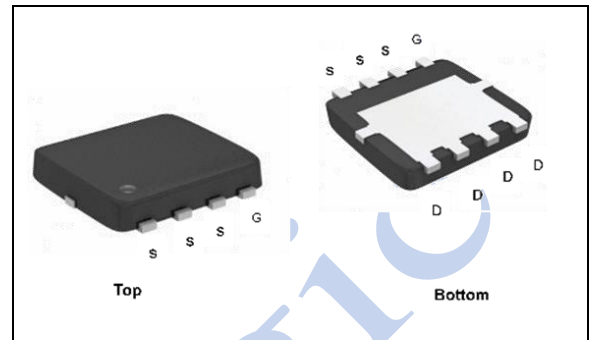
Ordering code	Package	Device code
SDA04K1P1C-AA	PDFN5X6-8L	AJD

1. Maximum ratings

Absolute maximum ratings ($T_A = 25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-source voltage	V_{DS}	40	V
Gate-source voltage	V_{GS}	± 20	
Continuous drain current	I_D	$T_C = 25^\circ\text{C}$ ⁽¹⁾	A
		$T_C = 100^\circ\text{C}$	
		$T_A = 25^\circ\text{C}$ ⁽⁴⁾	
Pulsed drain current ⁽²⁾	$I_{D,pulse}$	1197	
Avalanche energy, single pulse ⁽³⁾	E_{AS}	250	mJ
Power dissipation	P_D	$T_C = 25^\circ\text{C}$	W
		$T_A = 25^\circ\text{C}$ ⁽⁴⁾	
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	$R_{\theta JC}$	0.9	°C/W
Thermal resistance, junction-to-ambient ⁽⁴⁾	Steady state	$R_{\theta JA}$	45	

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 V, I _D = 250 μA	40			V
Gate-source threshold voltage	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 250 μA	1.4	2	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} = 40 V, V _{GS} = 0 V			1	μA
Drain-source on-resistance	R _{DS(on)}	V _{GS} = 10 V, I _D = 60 A		0.9	1.1	mΩ
Drain-source on-resistance	R _{DS(on)}	V _{GS} = 4.5 V, I _D = 20 A		1.4	2	mΩ
Forward transconductance ⁽⁵⁾	g _{fs}	V _{DS} = 5 V, I _D = 60 A		299		S
Gate resistance	R _g	f = 1 MHz		4		Ω
Dynamic ⁽⁵⁾						
Total gate charge	Q _g	V _{DS} = 20 V, I _D = 60 A, V _{GS} = 4.5 V		44		nC
Total gate charge	Q _g	V _{DS} = 20 V, I _D = 60 A, V _{GS} = 10 V		90		
Gate-source charge	Q _{gs}			24		
Gate-drain charge	Q _{gd}			12		
Turn-on delay time	t _{d(on)}	V _{DS} = 20 V, I _D = 60 A, V _{GS} = 10 V, R _{GEN} = 6 Ω		36		ns
Rise time	t _r			45		
Turn-off delay time	t _{d(off)}			130		
Fall time	t _f			45		
Input capacitance	C _{iss}	V _{DS} = 20 V, V _{GS} = 0 V, f = 1 MHz		6760		pF
Output capacitance	C _{oss}			2420		
Reverse transfer capacitance	C _{rss}			75		
Reverse Diode Characteristics ⁽⁵⁾						
Diode forward voltage	V _{SD}	V _{GS} = 0 V, I _F = 60 A		0.83	1.1	V
Reverse recovery time	t _{rr}	V _{DS} = 20 V, I _F = 60 A, di/dt = 100 A/μs		73		ns
Reverse recovery charge	Q _{rr}			100		nC

Notes

- (1) Limited by maximum junction temperature.
- (2) Pulse width limited by maximum junction temperature.
- (3) $V_{DS} = 20\text{ V}, V_{GS} = 10\text{ V}, L = 0.3\text{ mH}$.
- (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

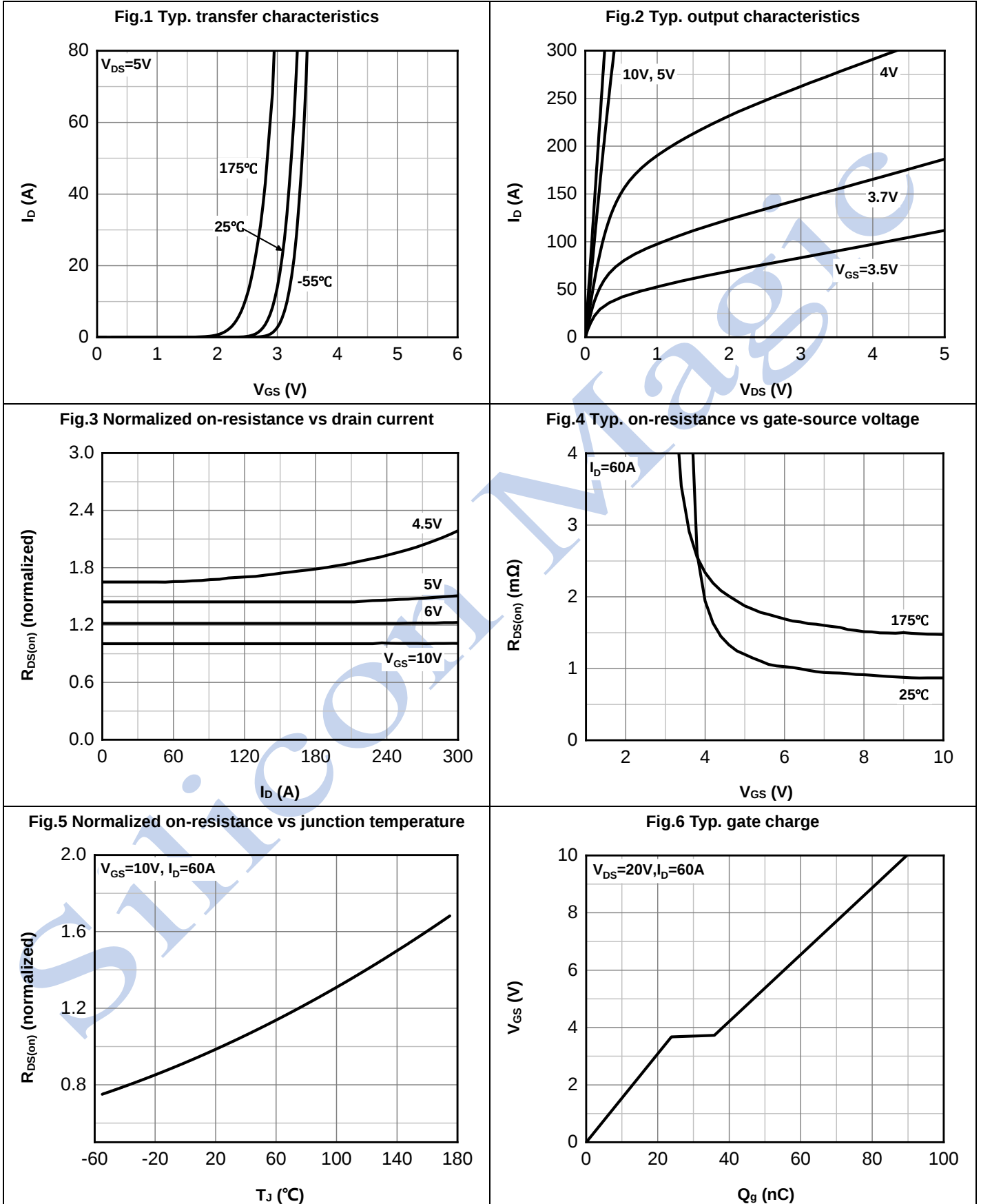


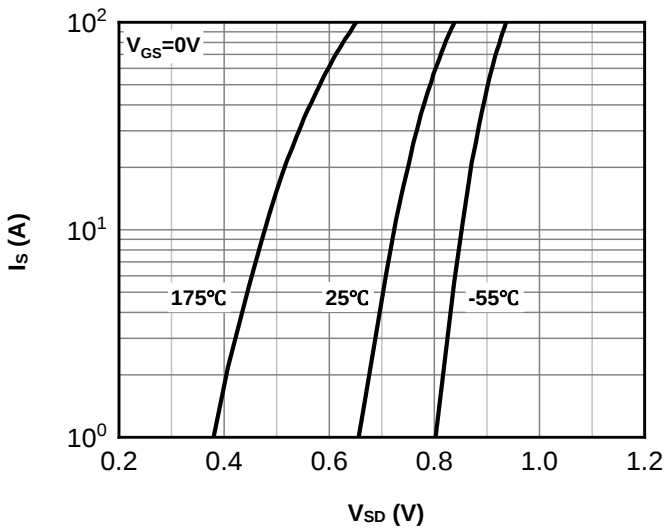
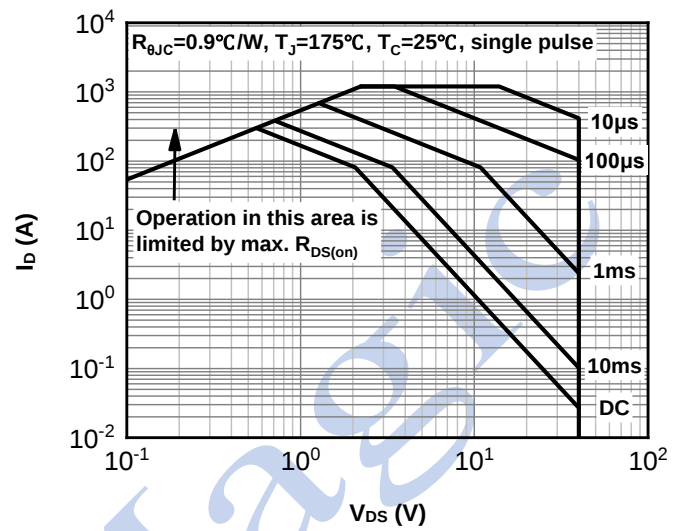
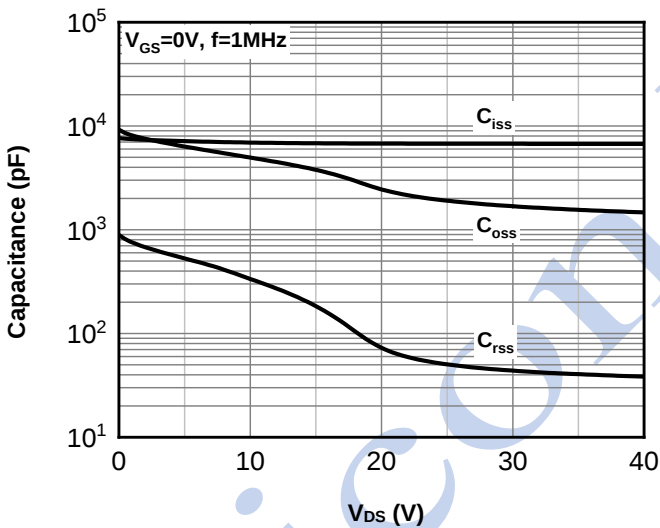
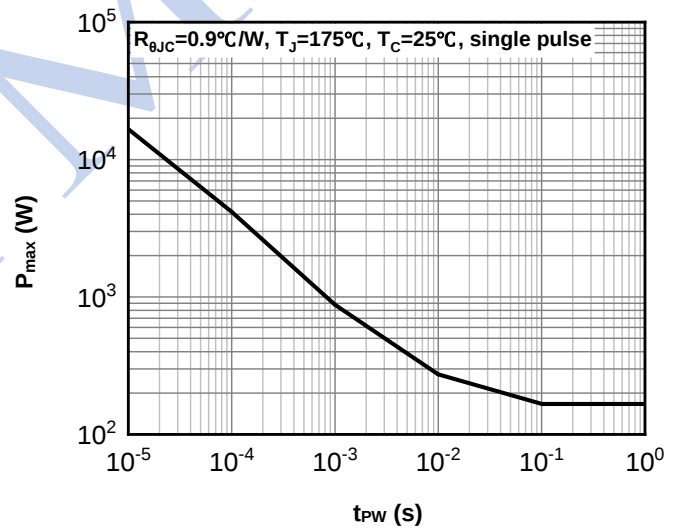
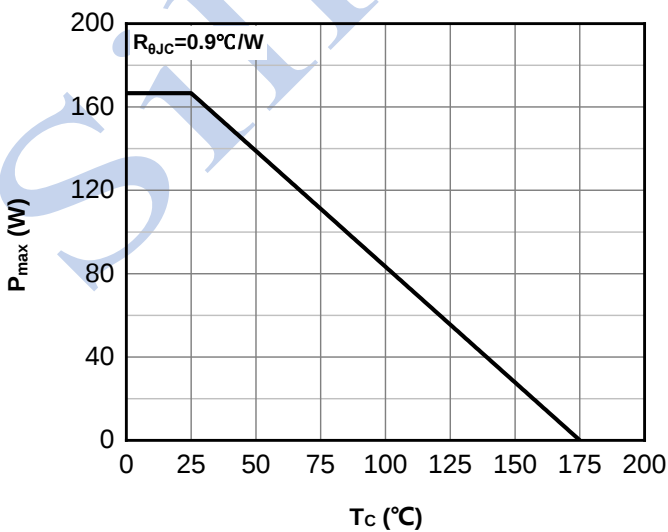
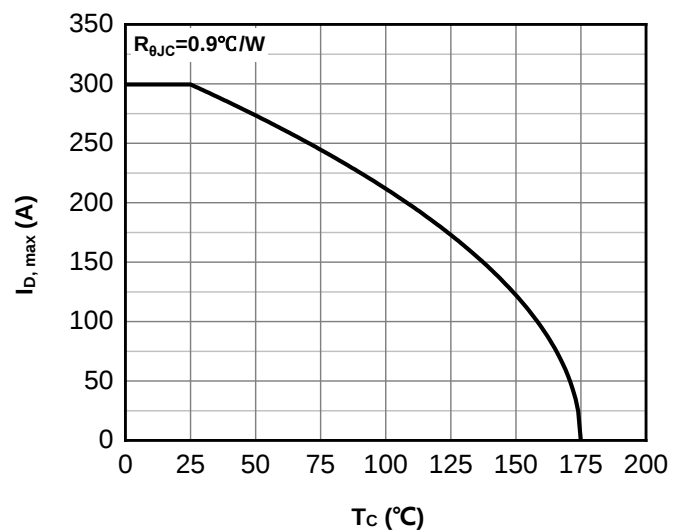
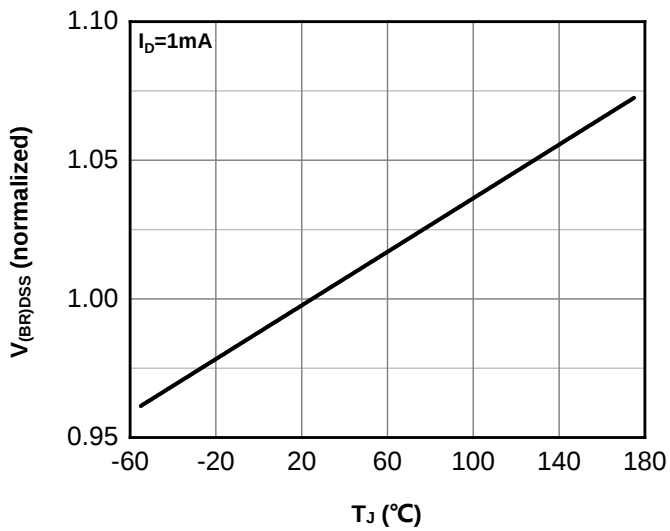
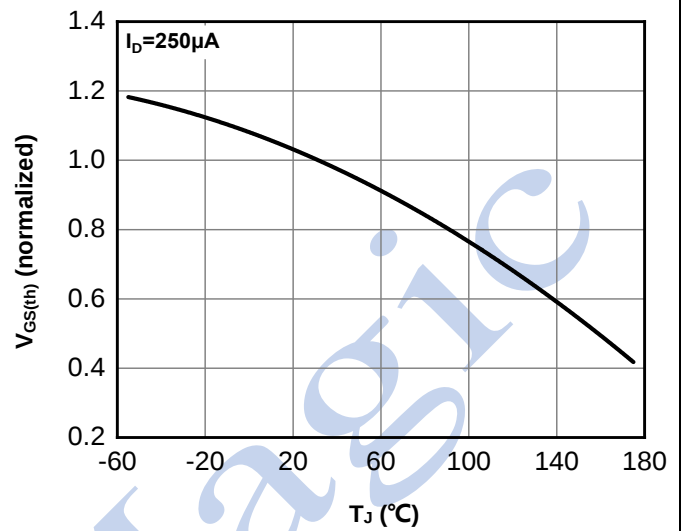
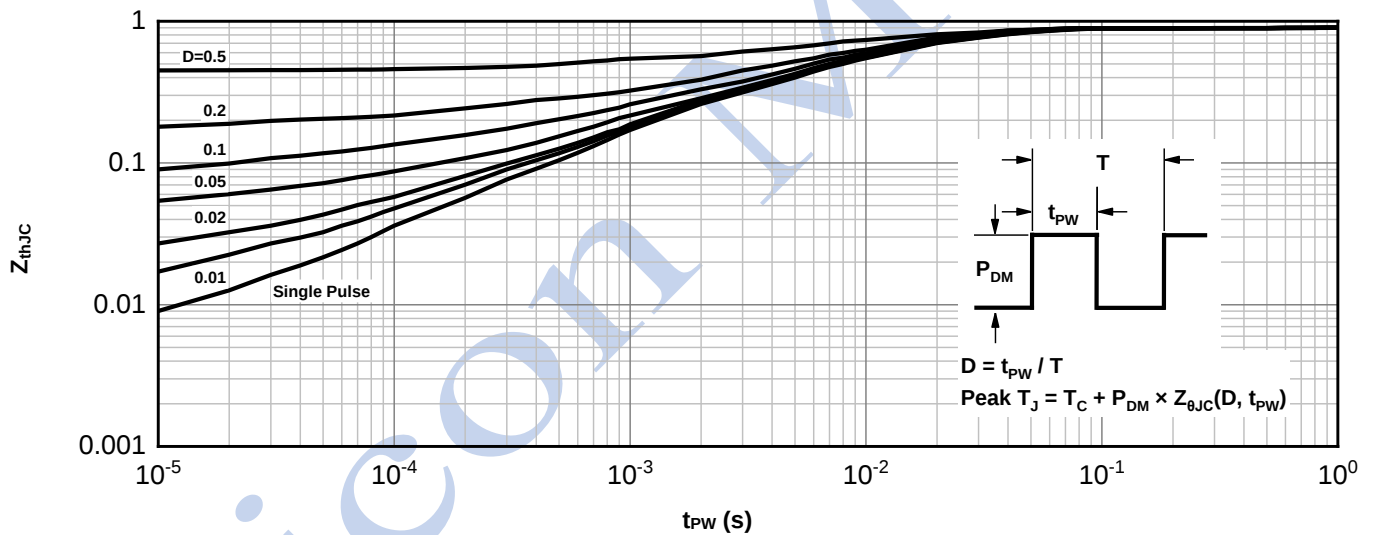
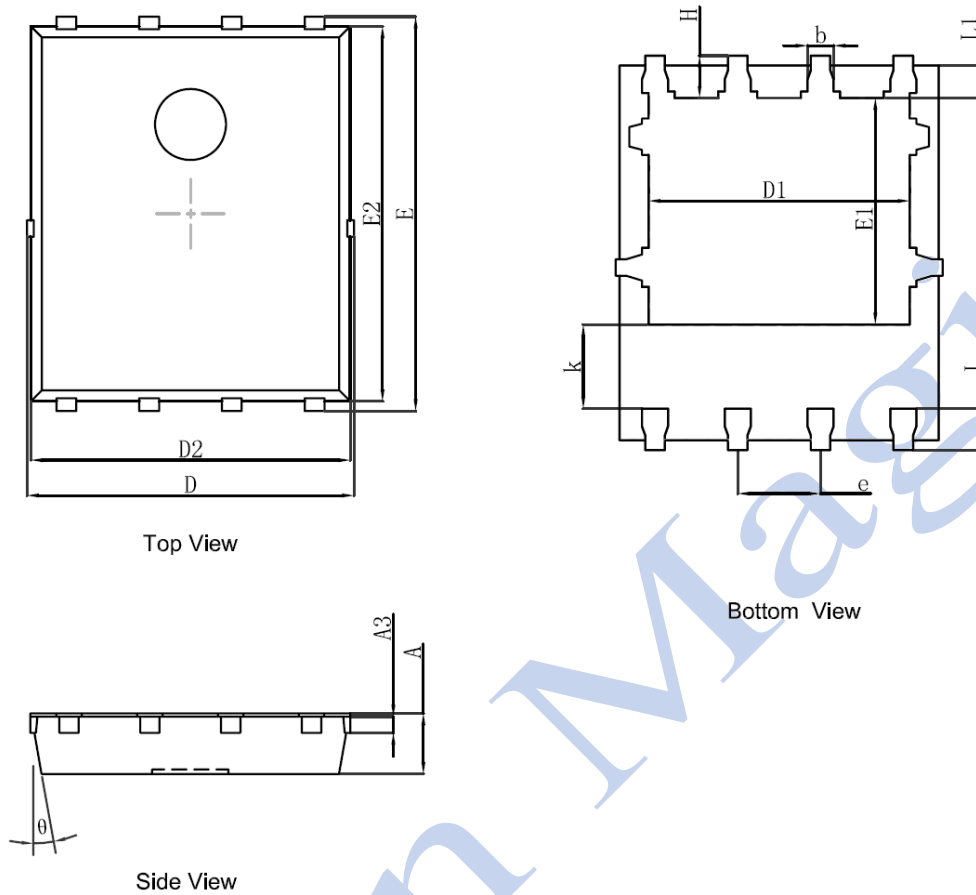
Fig.7 Typ. forward characteristics of body diode

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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