

N-Channel 40V MOSFET

Product summary

V_{DS} (V)	$R_{DS(on),max}$ (m Ω)	I_D (A)
40	5.1 @ $V_{GS} = 10V$	68 ⁽¹⁾

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

 is the registered trademark of Hangzhou Silicon-Magic Semiconductor Technology Co., Ltd.

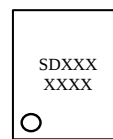
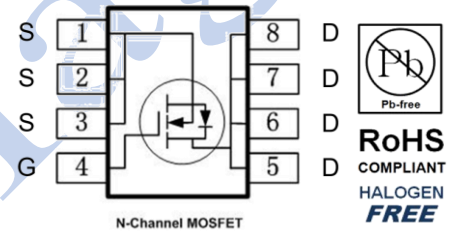
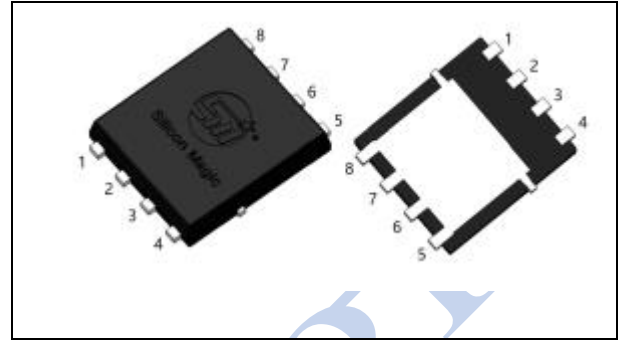
Package and ordering information

Ordering code	Package	Device code
SDA04K5P1C-AA	PDFN5*6-8L	AOY

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	$T_C = 25^\circ\text{C}$ ⁽¹⁾	I_D	68	A
	$T_C = 100^\circ\text{C}$		53.6	
	$T_A = 25^\circ\text{C}$ ⁽⁴⁾		18.2	
Pulsed drain current ⁽²⁾		$I_{D,pulse}$	272	
Avalanche energy, single pulse ⁽³⁾		E_{AS}	20	mJ
Power dissipation	$T_C = 25^\circ\text{C}$	P_D	51.7	W
	$T_A = 25^\circ\text{C}$ ⁽⁴⁾		3	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

PDFN5*6-8L



SDXXX
XXXX

Device code
Silicon Magic discrete device

XXXX

Wafer lot number
Work week code
Year code

2. Thermal resistance ratings

Thermal resistance ratings				
Parameter		Symbol	Max.	Unit
Thermal resistance, junction-to-case	Steady state	$R_{\theta JC}$	2.9	°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 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	2.6	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 = 20 A		4.2	5.1	mΩ
		V _{GS} = 4.5 V, I _D = 10 A		6.4	8.9	
Forward transconductance ⁽⁵⁾	g _{fs}	V _{DS} = 5 V, I _D = 20 A		60.8		S
Gate resistance	R _g	f = 1 MHz		2.4		Ω
Dynamic ⁽⁵⁾						
Total gate charge	Q _g	V _{DS} = 20 V, I _D = 10 A, V _{GS} = 4.5 V		8		nC
Total gate charge	Q _g	V _{DS} = 20 V, I _D = 20 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 =20 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 = 20 A		0.8	1.1	V
Reverse recovery time	t _{rr}	V _{DS} = 20 V, I _F = 20 A, di/dt = 100 A/μs		30.3		ns
Reverse recovery charge	Q _{rr}				19.2	

Notes

- (1) Package Limited.
- (2) Pulse width limited by Package.
- (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

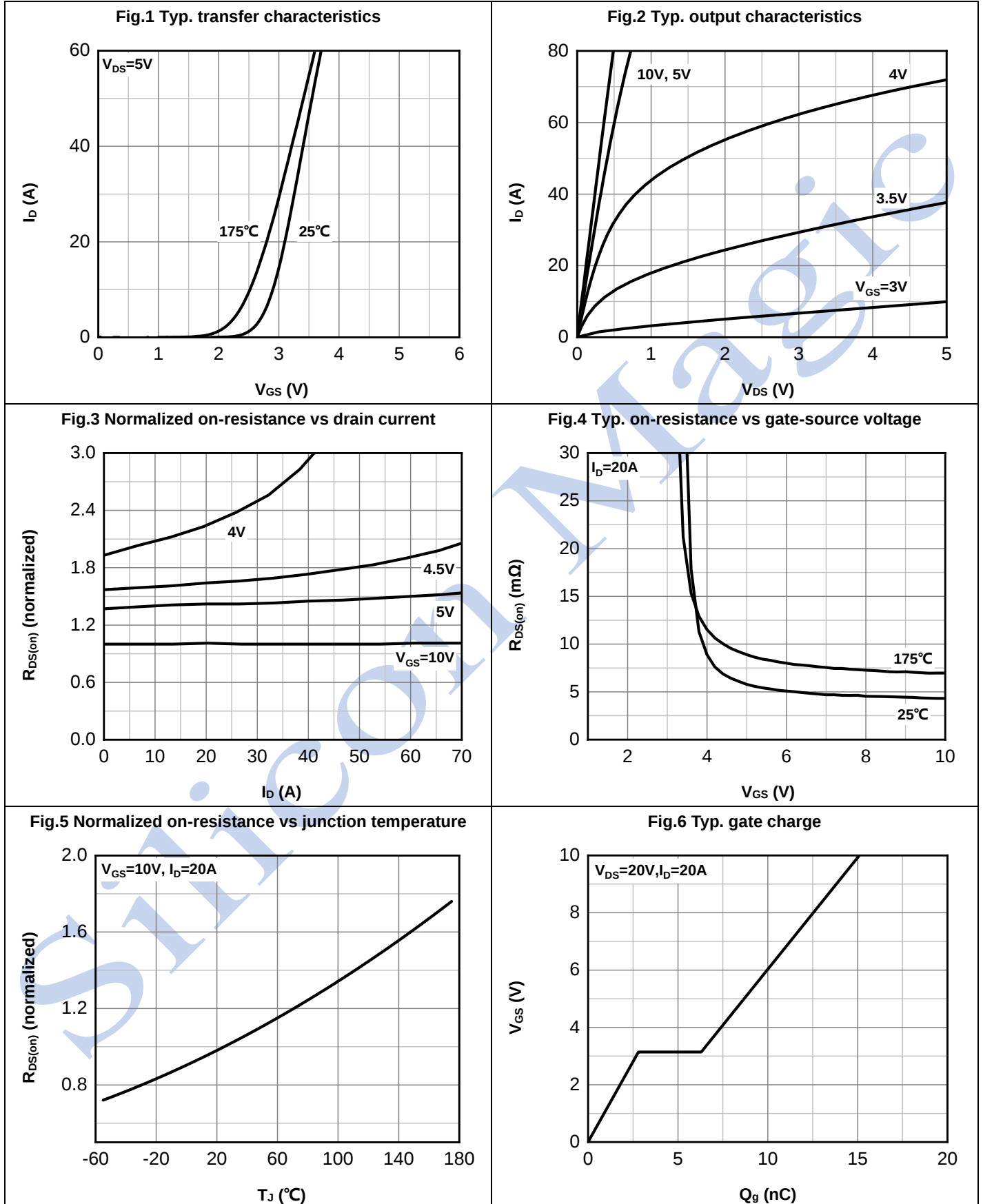


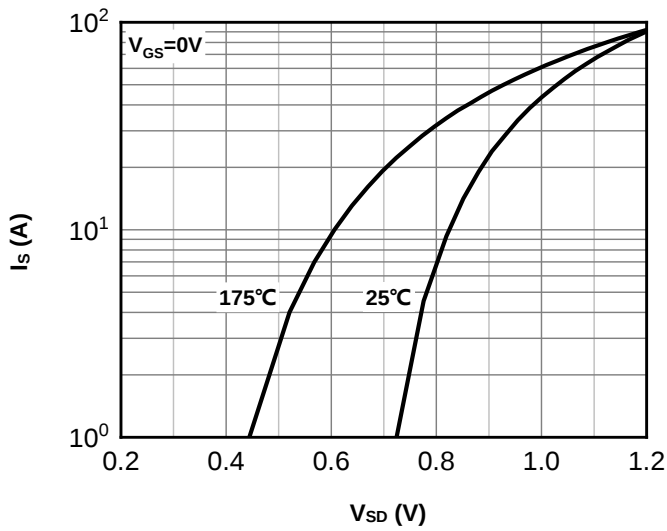
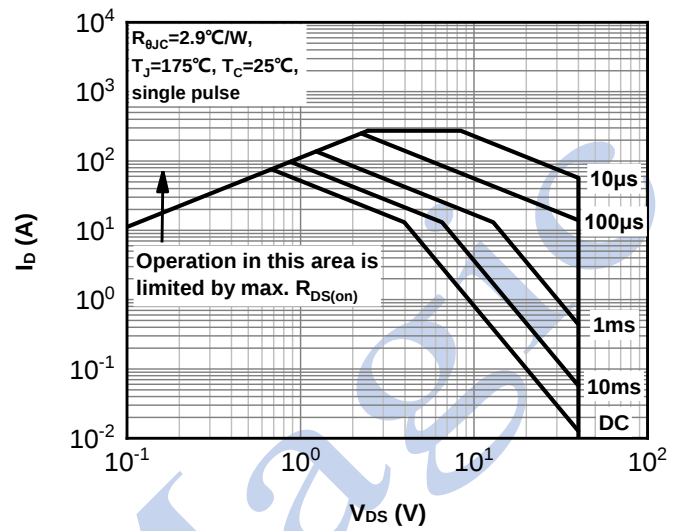
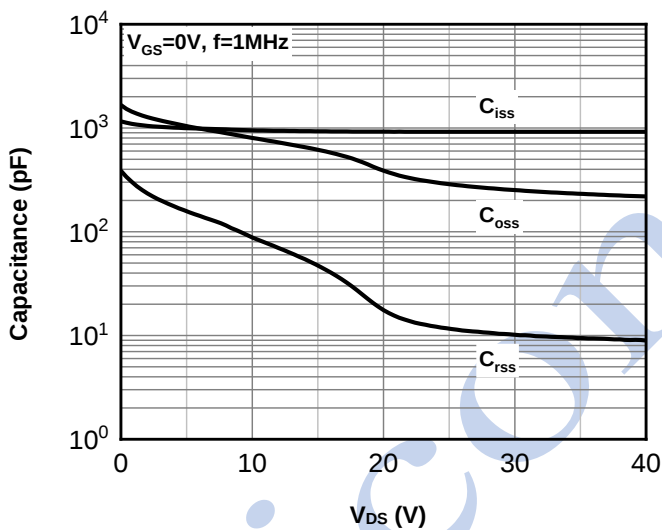
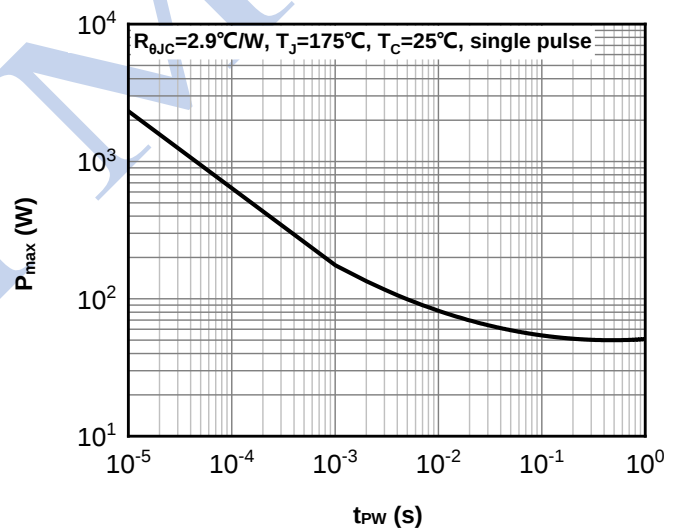
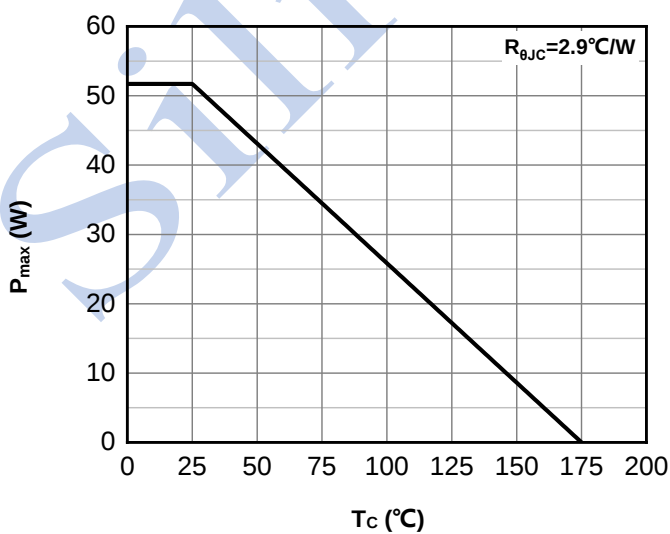
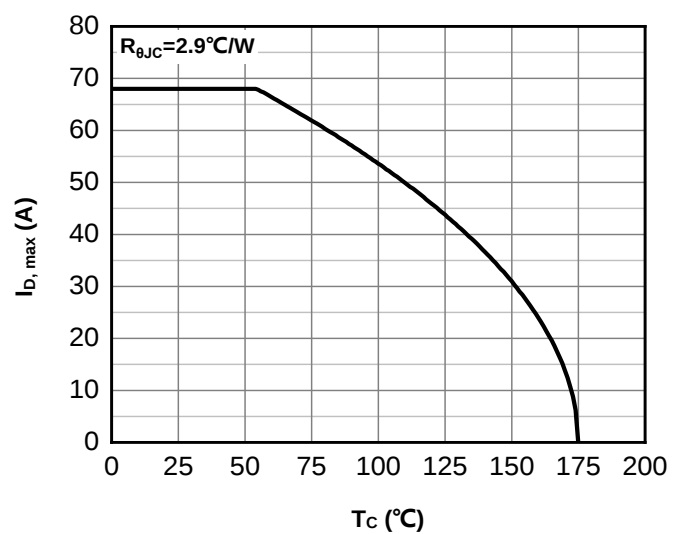
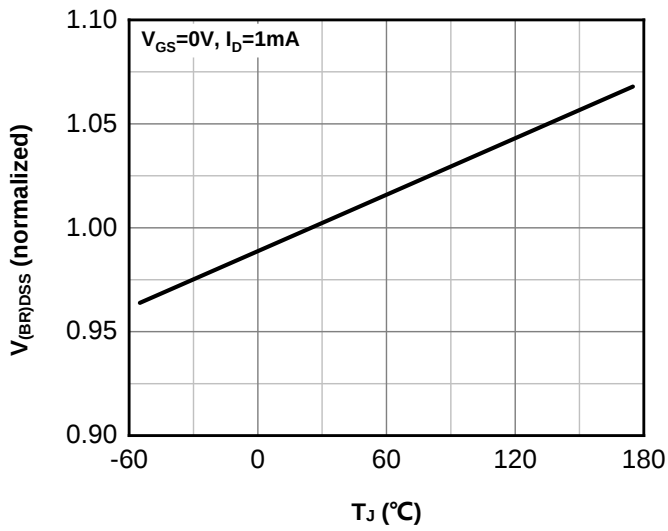
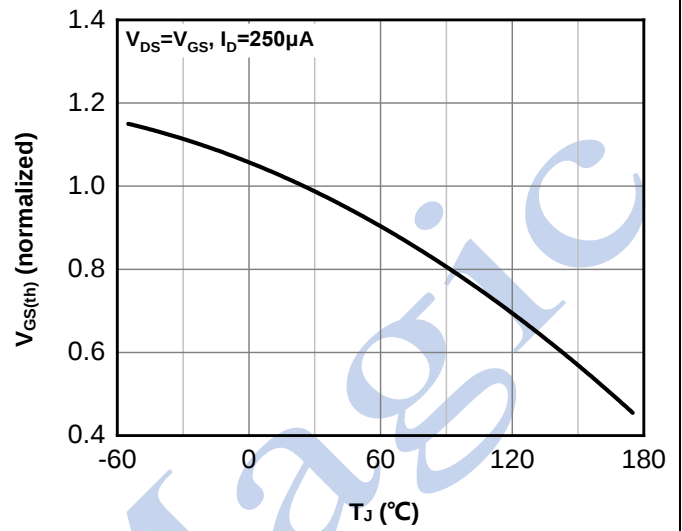
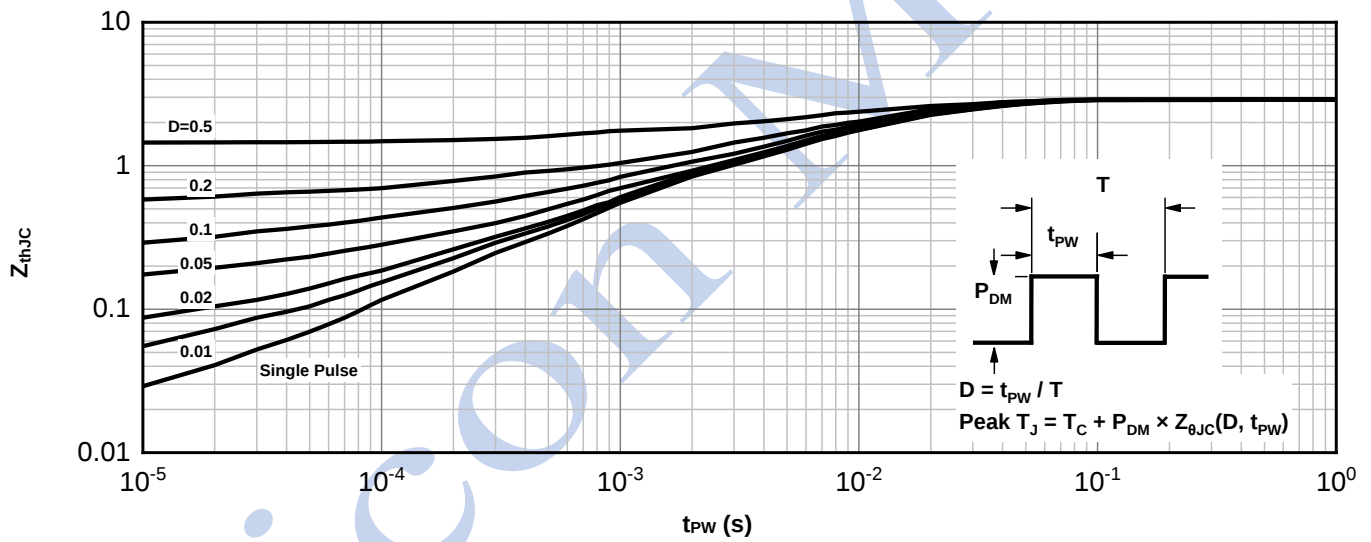
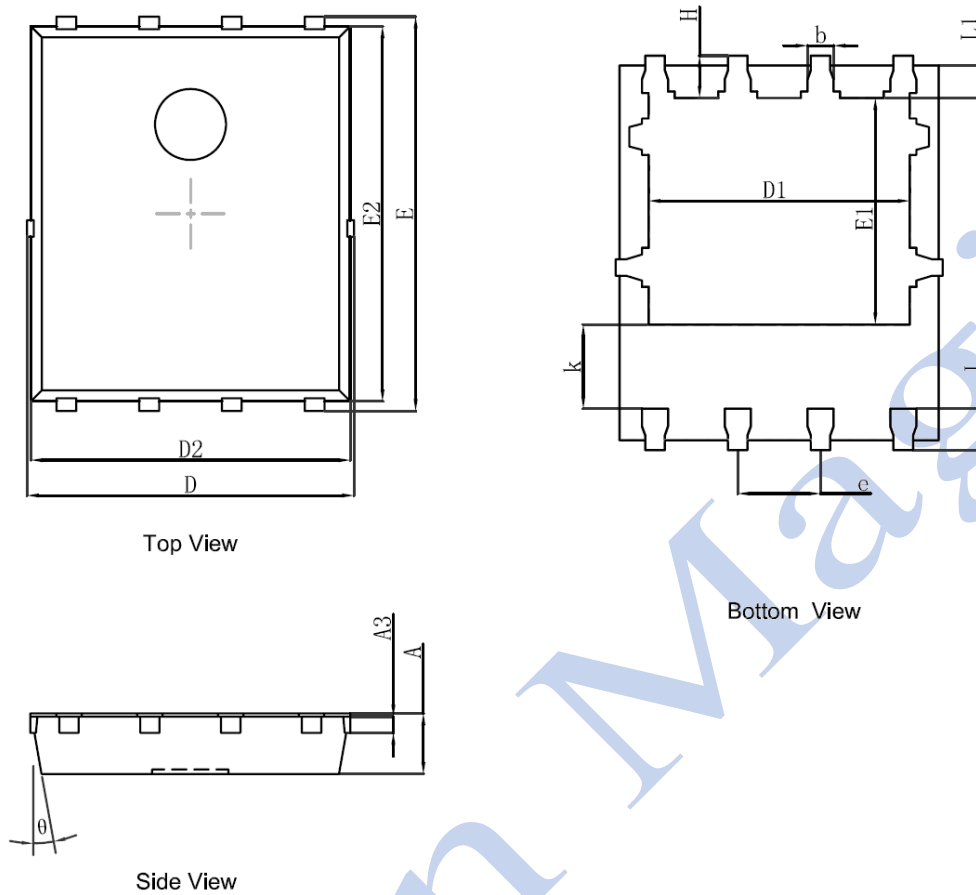
Fig.7 Typ. forward characteristics of body diode

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°

Legal Disclaimer

The information given in this document shall be for illustrative purposes only and shall in no event be regarded as a guarantee of conditions or characteristics. Silicon Magic Technologies reserves the right to change any information herein. With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Silicon Magic Technologies or its affiliates hereby make no representation or warranty of any kind, expressed or implied, as to any information provided hereunder, including without limitation as to the accuracy, completeness or non-infringement of intellectual property rights of any third party, and they assume no liability for the consequences of use of such information. In addition, any information given in this document is subject to customer's compliance with its obligations stated herein and any applicable legal requirements, norms and standards concerning customer's products and any use of the product of Silicon Magic Technologies in customer's applications. The information contained herein is exclusively intended for technically trained staff. No license is granted by implication under any patent right, copyright, mask work right, or other intellectual property right. It is customer's sole responsibility to evaluate the suitability of the product for the intended application and the completeness of the product information given herein with respect to such application. In no event shall Silicon Magic Technologies or its affiliates be liable to any party for any direct, indirect, special, punitive, incidental or consequential damages of any nature whatsoever, including but not limited to loss of profits and loss of goodwill, whether or not such damages are based on tort or negligence, warranty, breach of contract or any other legal theory. In addition, any recipient of this document and the relevant products samples may not alter, decompile, disassemble, reverse engineer, or otherwise modify any information/samples received hereunder. Any intellectual property rights arising from the reverse engineering of Silicon Magic's products shall belong to Silicon Magic.