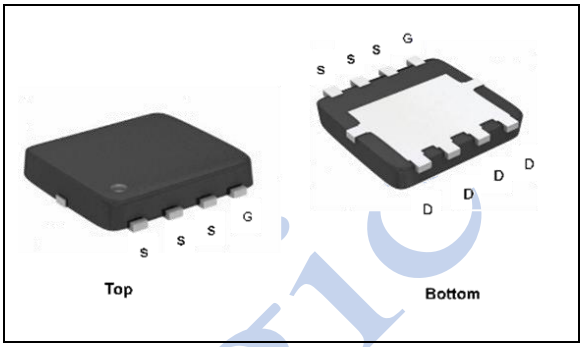
N-Channel 40V MOSFET

Product summary

V_{DS} (V)	$R_{DS(on),max}$ (mΩ)	I_D (A)
40	1.4 @ V_{GS} = 10V	212 (1)

DFN5*6-8L

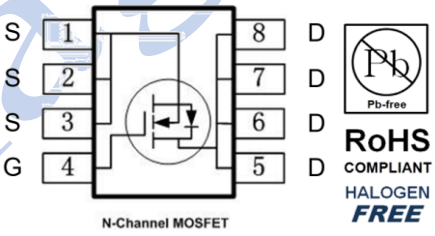


Features

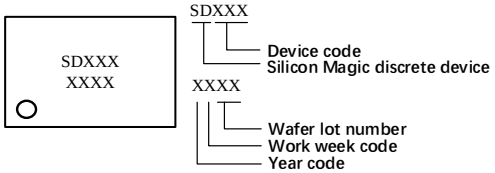
- Low $R_{DS(on)}$ trench technology
- Low thermal impedance
- Fast switching speed
- 100% avalanche tested

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
SDH04N1P4C-AA	PDFN5*6-8L	AGS

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	212	A
	T_C=100℃		134	
	T_A=25℃ (4)		34	
Pulsed drain current(2)		$I_{D,pulse}$	849	
Avalanche energy, single pulse(3)		E_{AS}	521	mJ
Power dissipation	T_C=25℃	P_D	104	W
	T_A=25℃ (4)		2.7	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to 150	℃

2. Thermal resistance ratings

Thermal resistance ratings				
Parameter		**Symbol**	**Max.**	**Unit**
Thermal resistance, junction-to-case	Steady state	$R_{\theta JC}$	1.2	℃/W
Thermal resistance, junction-to-ambient (4)	Steady state	$R_{\theta JA}$	45	

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	2.2	3	3.8	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 = 50 A		1.1	1.4	mΩ
Forward transconductance(5)	g_{fs}	V_{DS} = 5 V, I_D = 50 A		180		S
Gate resistance	R_g	f = 1 MHz		3		Ω
Dynamic(5)						
Total gate charge	Q_g	V_{DS} = 20 V, I_D = 50 A, V_{GS} = 10 V		46		nC
Gate-source charge	Q_{gs}			17		
Gate-drain charge	Q_{gd}			8.5		
Turn-on delay time	$t_{d(on)}$	V_{DS} = 20 V, I_D = 50 A, V_{GS} = 10 V, R_{GEN} = 4.7 Ω		43		ns
Rise time	t_r			108		
Turn-off delay time	$t_{d(off)}$			54		
Fall time	t_f			25		
Input capacitance	C_{iss}	V_{DS} = 20 V, V_{GS} = 0 V, f = 1 MHz		3520		pF
Output capacitance	C_{oss}			1630		
Reverse transfer capacitance	C_{rss}			63		
Reverse Diode Characteristics(5)						
Diode forward voltage	V_{SD}	V_{GS} = 0 V, I_F = 50 A		0.8	1.1	V
Reverse recovery time	t_{rr}	V_{DS} = 20 V, I_F = 50 A, di/dt = 100 A/μs		49		ns
Reverse recovery charge	Q_{rr}			43		nC

Notes

(1) Limited by maximum junction temperature.

(2) Pulse width limited by maximum junction temperature.

(3) V_{DS} = 40 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

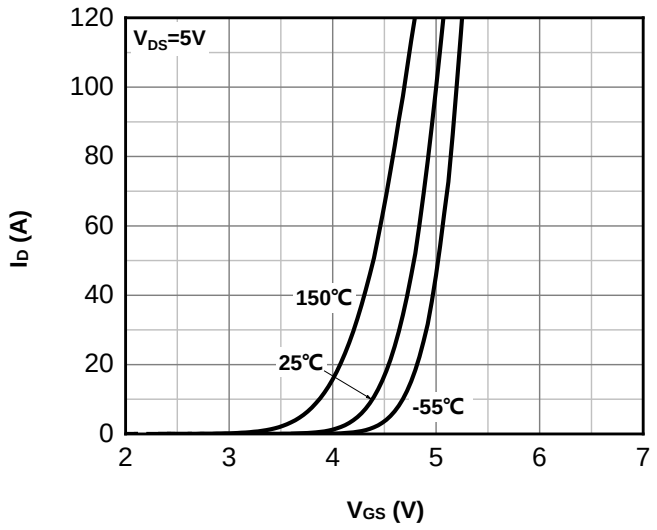


Fig.2 Typ. output characteristics

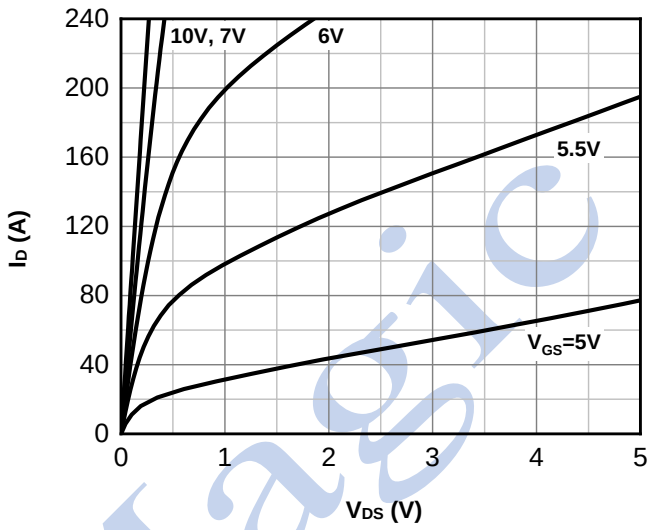


Fig.3 Normalized on-resistance vs drain current

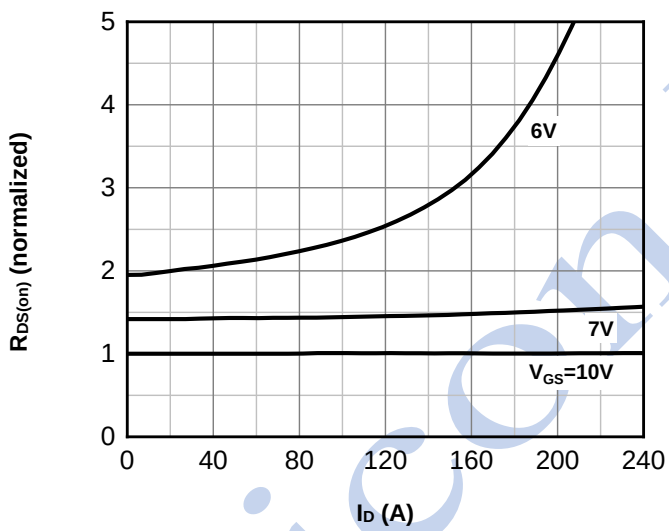


Fig.4 Typ. on-resistance vs gate-source voltage

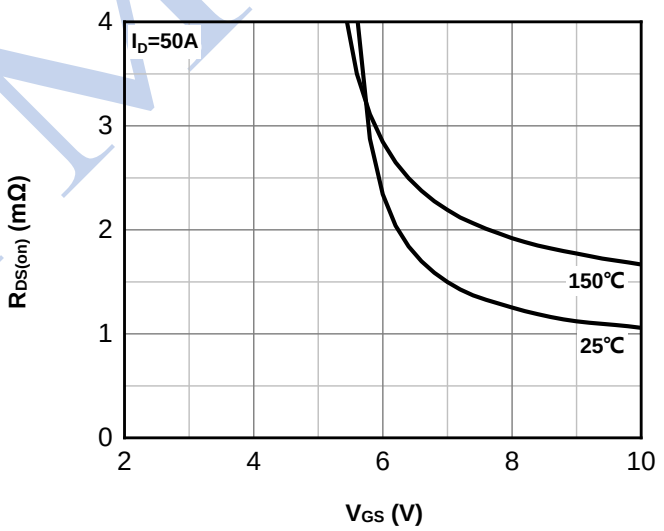


Fig.5 Normalized on-resistance vs junction temperature

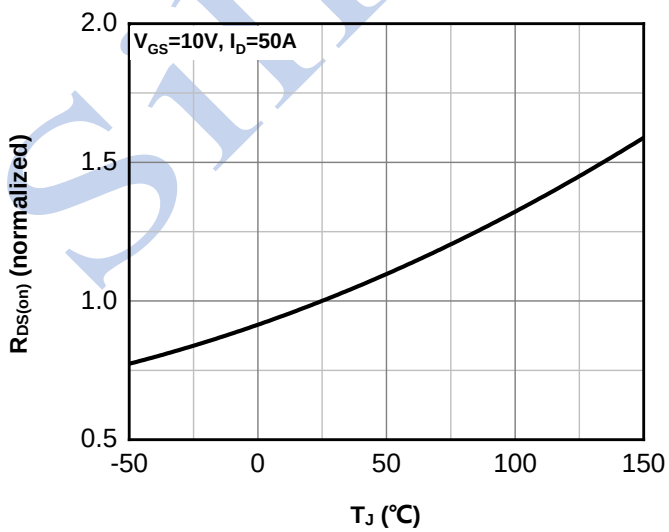


Fig.6 Typ. gate charge

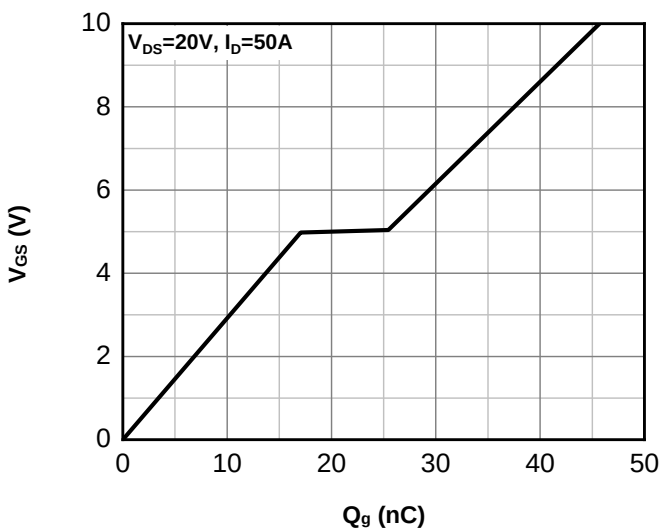


Fig.7 Typ. forward characteristics of body diode

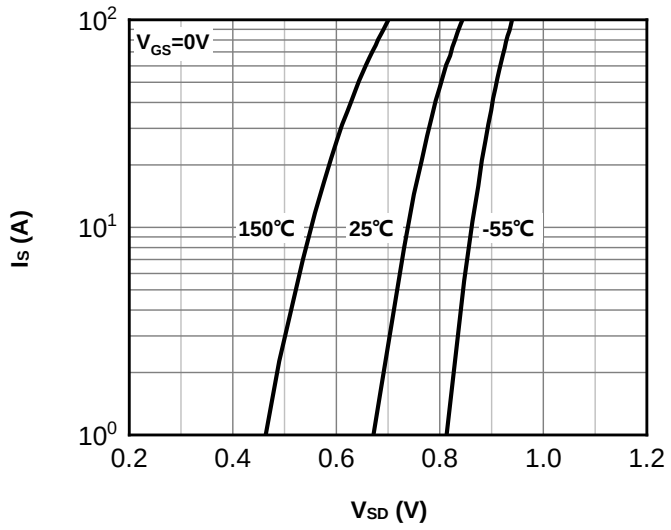


Fig.8 Safe operating area

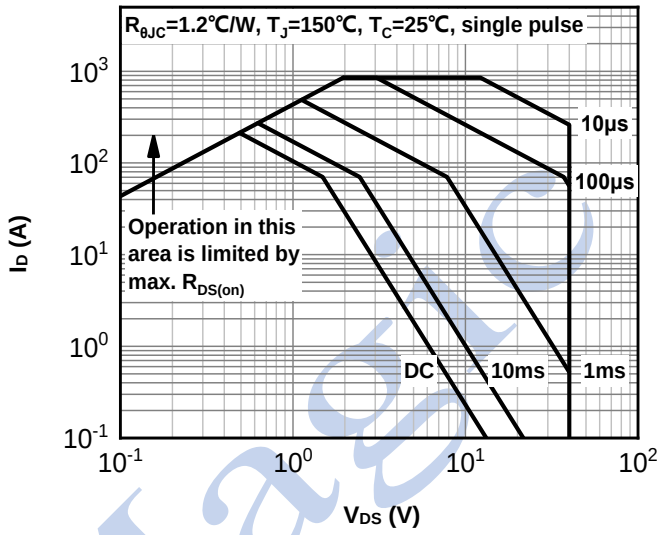


Fig.9 Typ. Capacitance

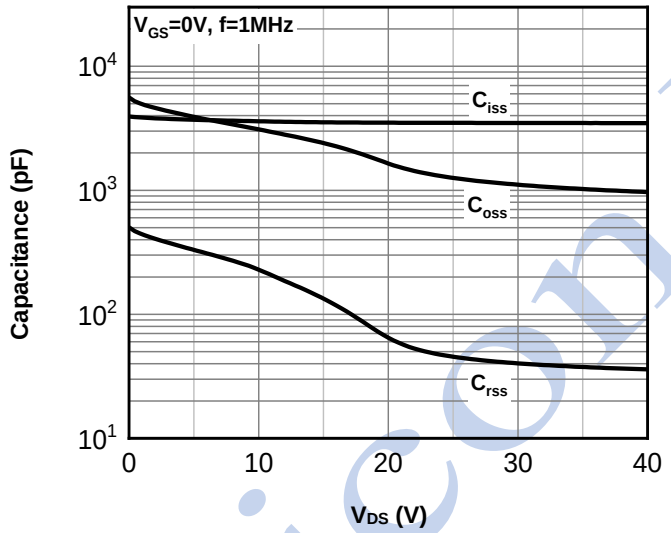


Fig.10 Single pulse maximum power dissipation

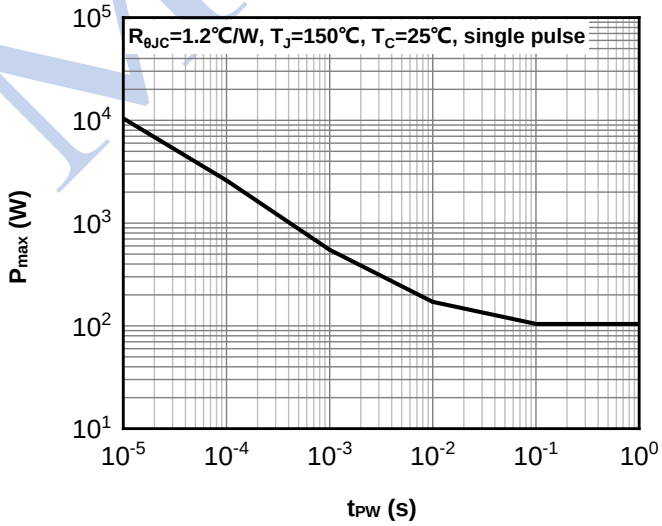


Fig.11 Max. power dissipation vs case temperature

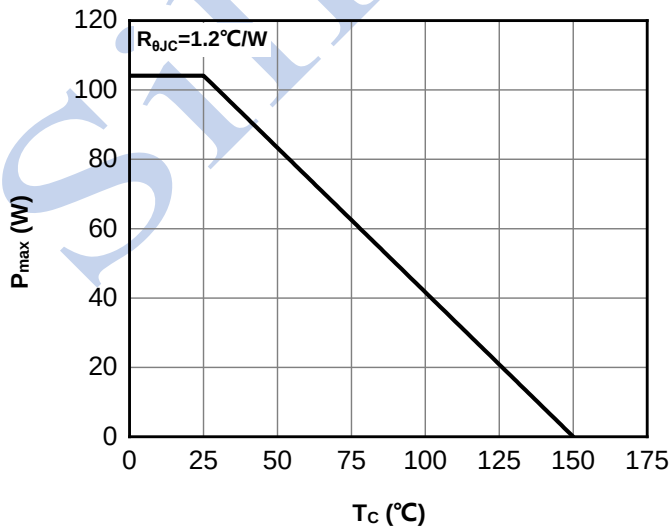


Fig.12 Max. continuous drain current vs case temperature

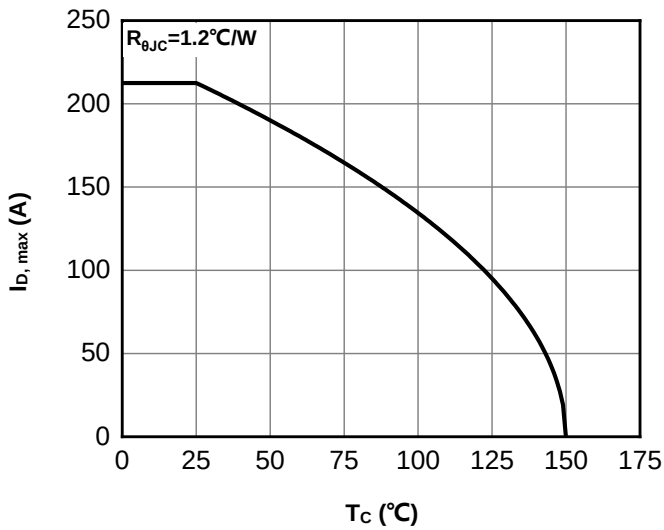


Fig.13 Normalized $V_{(BR)DSS}$ vs junction temperature

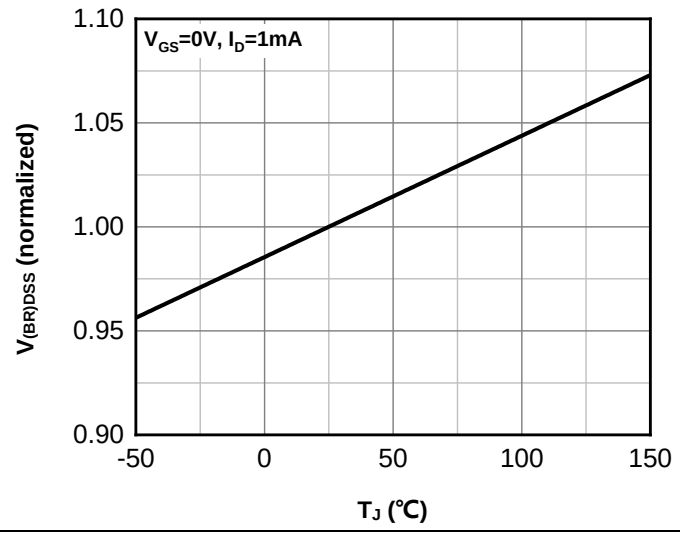


Fig.14 Normalized $V_{GS(th)}$ vs junction temperature

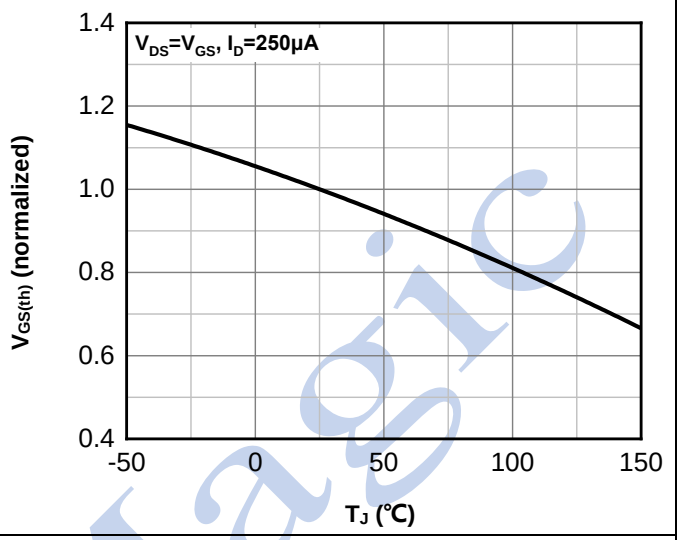
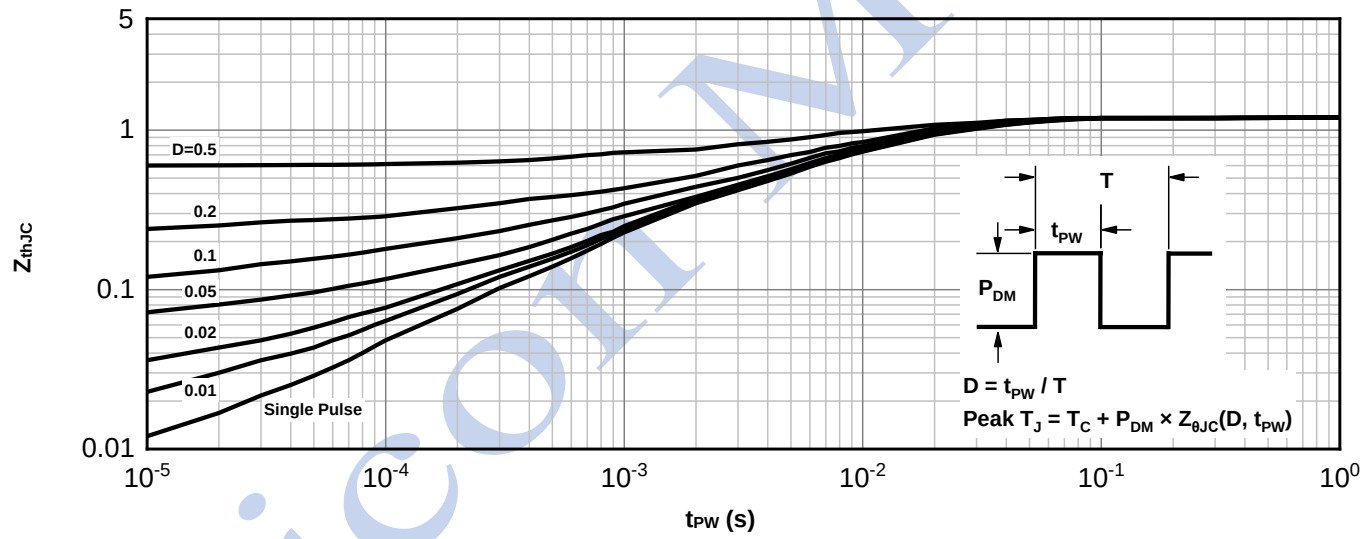
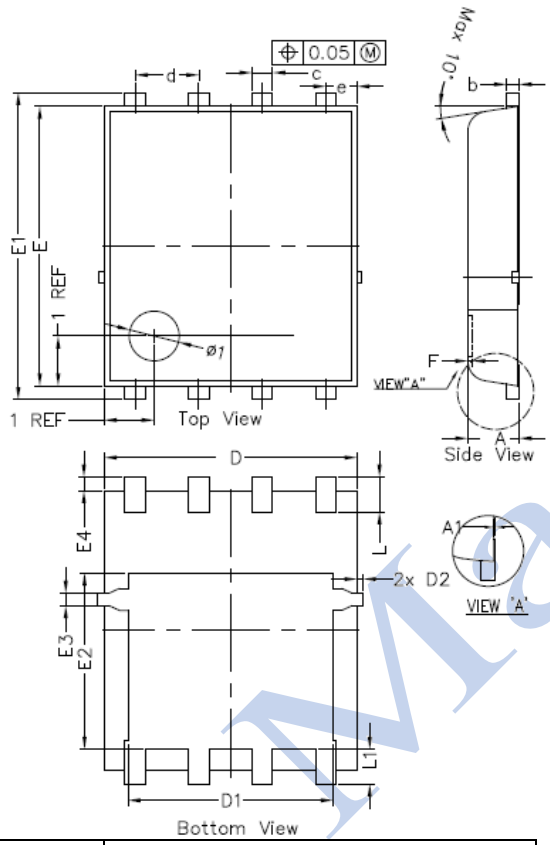


Fig.15 Transient thermal impedance from junction to case



5. Package outline dimensions



Dim	Millimeters		
	Min	Nom	Max
A	0.900	1.000	1.100
A1	0.000	---	0.050
b	0.246	0.254	0.312
c	0.310	0.410	0.510
d		1.27BSC	
D	4.950	5.050	5.150
D1	4.000	4.100	4.200
D2	---	---	0.125
e		0.62BSC	
E	5.500	5.600	5.700
E1	6.050	6.150	6.250
E2	3.425	3.525	3.625
E3	0.150	0.250	0.350
E4	0.175	0.275	0.375
F	---	---	0.100
L	0.500	0.600	0.700
L1	0.600	0.700	0.800

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.