

N-Channel 40V MOSFET

Product summary

V_{DS} (V)	$R_{DS(on),max}$ (m Ω)	I_D (A)
40	1.0 @ $V_{GS} = 10V$	229 ⁽¹⁾

Features

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

Applications

- DC/DC conversion
- Power switch
- Motor drives

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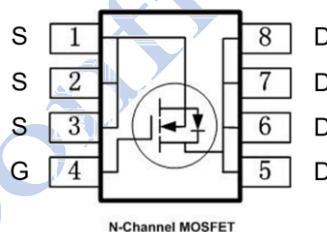
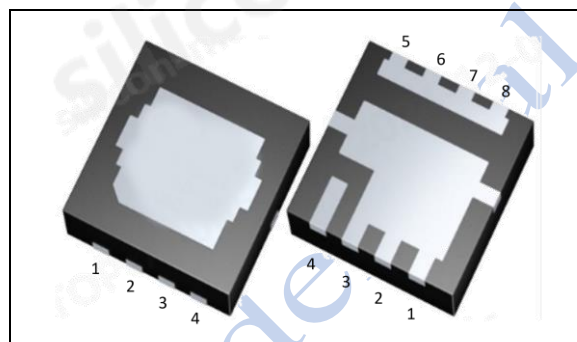
Package and ordering information

Ordering code	Package	Device code
SDH04L1P0VN-BA	DFN3.3*3.3 Source Down DSC - Corner Gate	SP

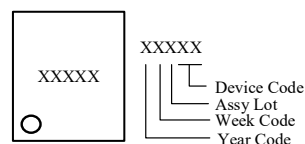
1. Maximum ratings

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	229	A
	$T_C = 100^\circ\text{C}$		162	
	$T_A = 25^\circ\text{C}$ ⁽⁴⁾		34	
Pulsed drain current ⁽²⁾		$I_{D,pulse}$	917	
Avalanche energy, single pulse ⁽³⁾		E_{AS}	210	mJ
Power dissipation	$T_C = 25^\circ\text{C}$	P_D	107	W
	$T_A = 25^\circ\text{C}$ ⁽⁴⁾		2.4	
Operating junction and storage temperature range		T_J, T_{stg}	-55 to 175	$^\circ\text{C}$

DFN3.3*3.3 Source Down DSC Corner Gate



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2. Thermal resistance ratings

Thermal resistance ratings				
Parameter		Symbol	Max.	Unit
Thermal resistance, junction-to-case	Steady state	$R_{\theta JC}$	1.4	°C/W
Thermal resistance, junction-to-ambient ⁽⁴⁾	Steady state	$R_{\theta JA}$	62.5	

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 = 1 mA	1	1.6	2.2	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		0.83	1.0	mΩ
		V _{GS} = 4.5 V, I _D = 10 A		1.26	1.5	
Forward transconductance ⁽⁵⁾	g _{fs}	V _{DS} = 5 V, I _D = 20 A		92		S
Gate resistance	R _g	f = 1 MHz		0.7		Ω
Dynamic ⁽⁵⁾						
Total gate charge	Q _g	V _{DS} = 20V, I _D = 10 A, V _{GS} = 4.5 V		28.3		nC
Total gate charge	Q _g	V _{DS} = 20V, I _D = 20 A, V _{GS} = 10 V		55.7		
Gate-source charge	Q _{gs}			9.6		
Gate-drain charge	Q _{gd}			12.7		
Turn-on delay time	t _{d(on)}	V _{DS} = 20V, I _D = 20 A, V _{GS} = 10 V, R _{GEN} = 6 Ω		6.0		ns
Rise time	t _r			11.6		
Turn-off delay time	t _{d(off)}			9.6		
Fall time	t _f			7.0		
Input capacitance	C _{iss}	V _{DS} = 20 V, V _{GS} = 0 V, f = 1 MHz		3490		pF
Output capacitance	C _{oss}			1284		
Reverse transfer capacitance	C _{rss}			47		
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		20		ns
Reverse recovery charge	Q _{rr}				35	

Notes

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

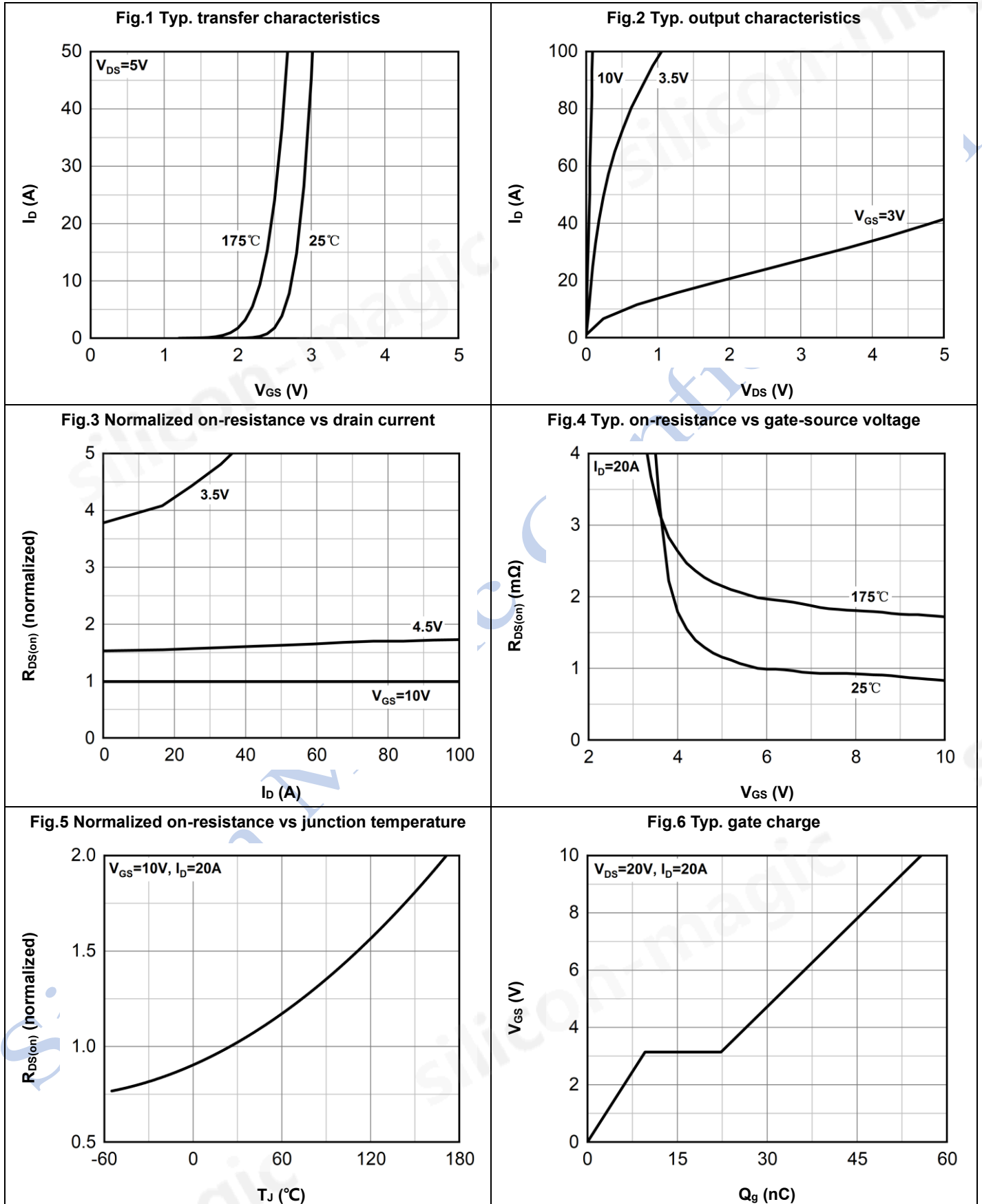


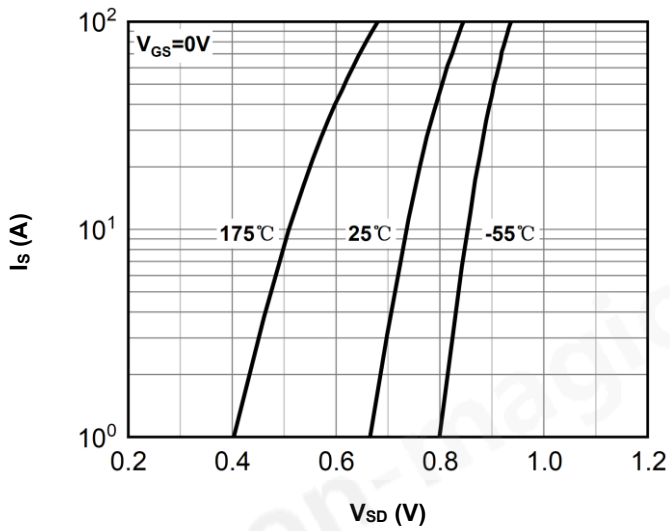
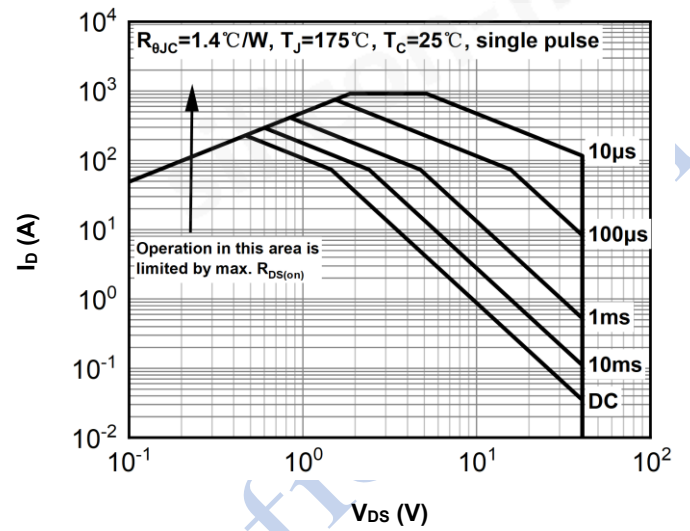
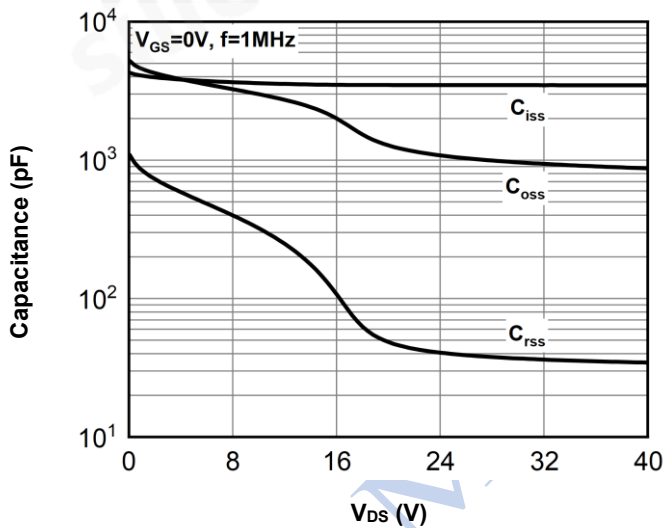
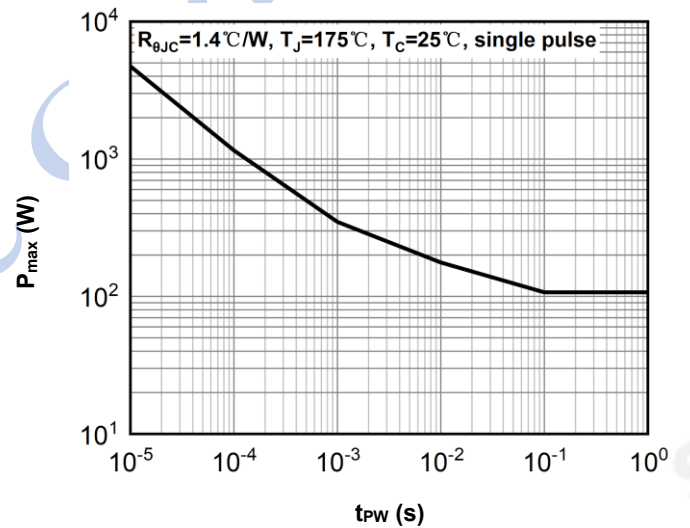
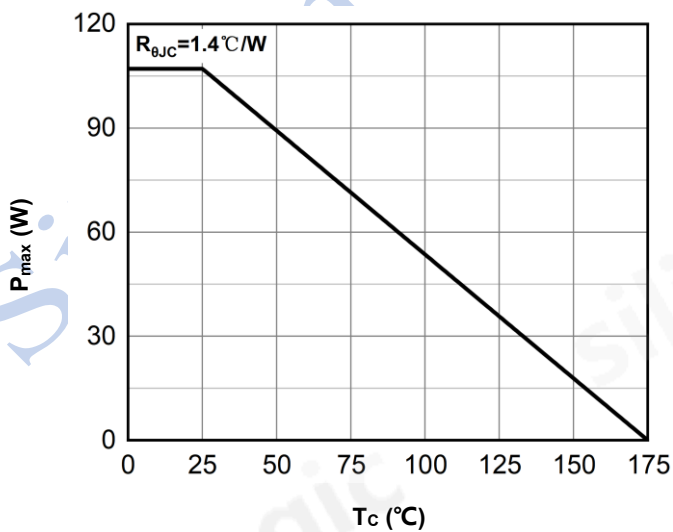
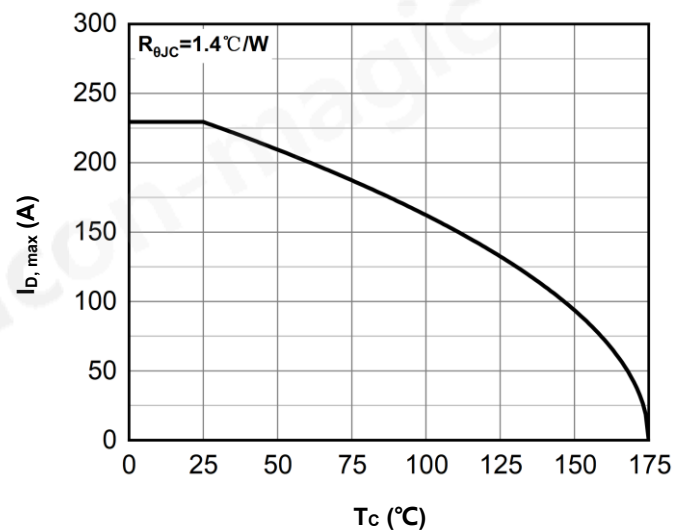
Fig.7 Typ. forward characteristics of body diode

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

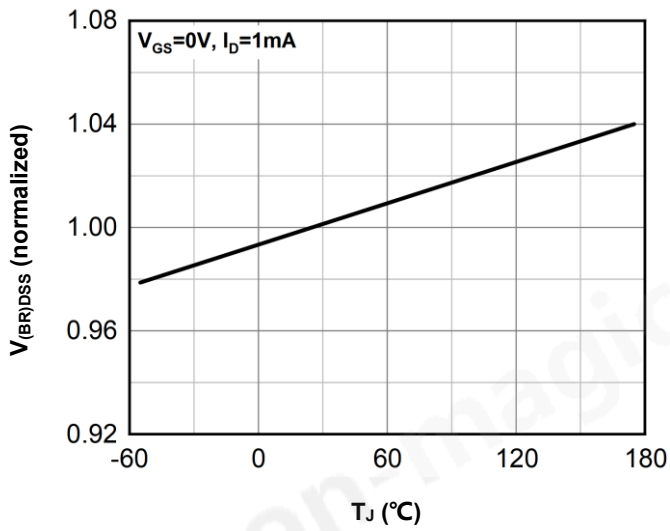


Fig.14 Normalized $V_{GS(th)}$ vs junction temperature

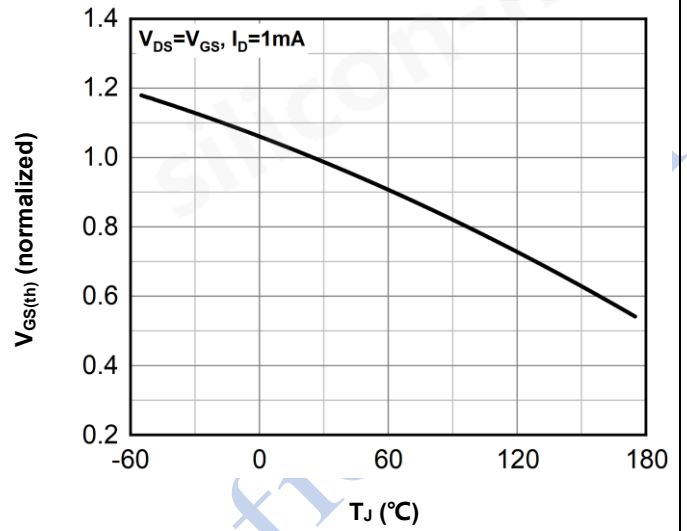
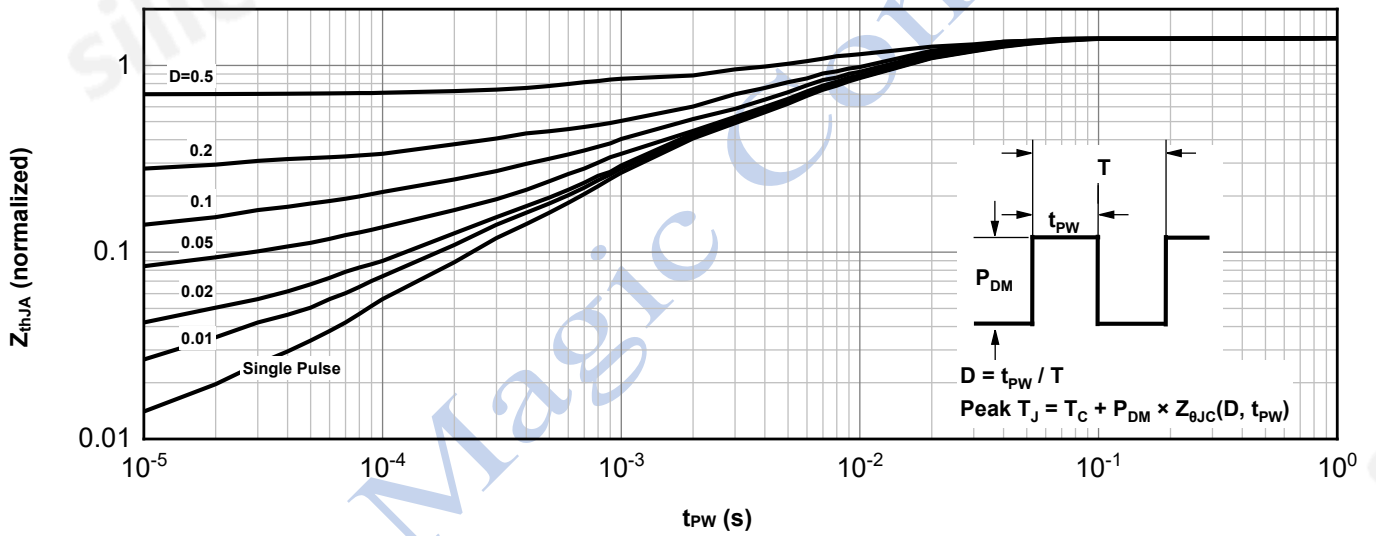
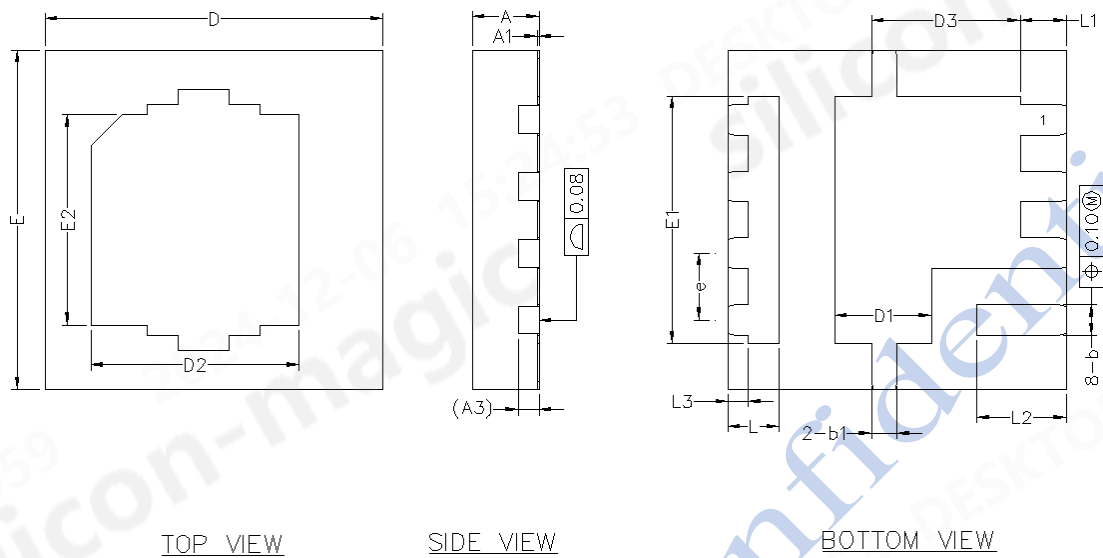


Fig.15 Normalized transient thermal impedance from junction to ambient



5. Package outline dimensions



Dim	Millimeters		
	Min	Nom	Max
A	0.55	0.65	0.75
A1	0.00	0.02	0.05
A3	0.203 REF		
b	0.20	0.30	0.40
b1	0.25 REF		
D	3.20	3.30	3.40
D1	0.84	0.94	1.04
D2	1.93	2.03	2.23
D3	1.35	1.45	1.55
E	3.20	3.30	3.40
E1	2.31	2.41	2.51
E2	1.95	2.05	2.25
e	0.55	0.65	0.75
L	0.40	0.50	0.60
L1	0.35	0.45	0.55
L2	0.77	0.87	0.97
L3	0.10	0.20	0.30

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