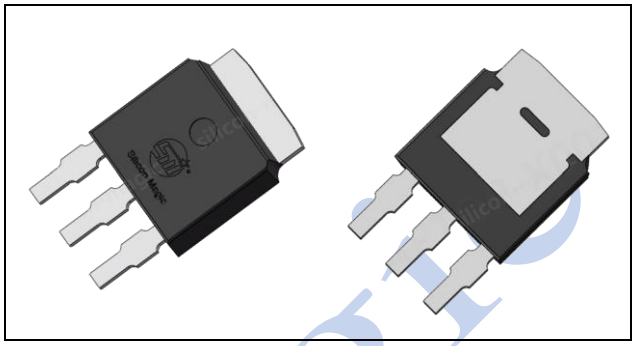
N-Channel 100 V MOSFET

Product summary

V_{DS} (V)	$R_{DS(on),max}$ (mΩ)	I_D (A)
100	7.8 @ V_{GS} = 10V	52 (1)

TO251-3L

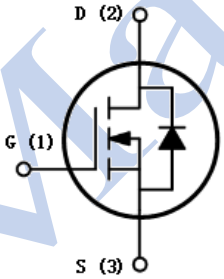


Features

- 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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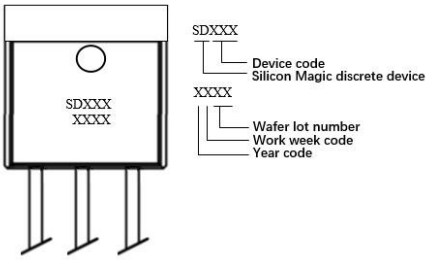


Package and ordering information

Ordering code	Package	Device code
SDN10K7P8U-AA	TO251-3L	APK

1. Maximum ratings

Absolute maximum ratings (T_A = 25℃ unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-source voltage		V_{DS}	100	V
Gate-source voltage		V_{GS}	±20	
Continuous drain current	T_C=25℃ (1)	I_D	52	A
	T_C=100℃		49	
	T_A=25℃ (4)		15	
Pulsed drain current(2)		$I_{D,pulse}$	208	
Avalanche energy, single pulse(3)		E_{AS}	240	mJ
Power dissipation	T_C=25℃	P_D	89.2	W
	T_A=25℃ (4)		2.5	
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	$R_{\theta JC}$	1.4	°C/W
Thermal resistance, junction-to-ambient (4)	Steady state	$R_{\theta JA}$	50	

3. Electrical Characteristics

Electrical characteristics						
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	100			V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	1.1	1.7	2.3	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} = 100 V, V_{GS} = 0 V			1	μA
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 40 A		6.5	7.8	mΩ
		V_{GS} = 4.5 V, I_D = 20 A		9.2	12	
Forward transconductance (5)	g_{fs}	V_{DS} = 5 V, I_D = 40 A		70		S
Gate resistance	R_g	f = 1MHz		2		Ω
Dynamic(5)						
Total gate charge	Q_g	V_{DS} = 50 V, I_D = 20 A, V_{GS} = 4.5 V		26		nC
Total gate charge	Q_g	V_{DS} = 50 V, I_D = 40 A, V_{GS} = 10 V		53		
Gate-source charge	Q_{gs}			12		
Gate-drain charge	Q_{gd}			9		
Turn-on delay time	$t_{d(on)}$	V_{DS} = 50 V, I_D = 40 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		22		ns
Rise time	t_r			56		
Turn-off delay time	$t_{d(off)}$			81		
Fall time	t_f			14		
Input capacitance	C_{iss}	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		3540		pF
Output capacitance	C_{oss}			435		
Reverse transfer capacitance	C_{rss}			15		
Reverse Diode Characteristics (5)						
Diode forward voltage	V_{SD}	V_{GS} = 0 V, I_F = 40 A		0.9	1.2	V
Reverse recovery time	t_{rr}	V_{DS} = 50 V, I_F = 40 A, di/dt = 100 A/μs		50		ns
Reverse recovery charge	Q_{rr}			51		nC

Notes

(1) Package limited.

(2) Pulse width limited by maximum junction temperature.

(3) V_{DS} = 50 V, V_{GS} = 10 V, L = 0.5 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

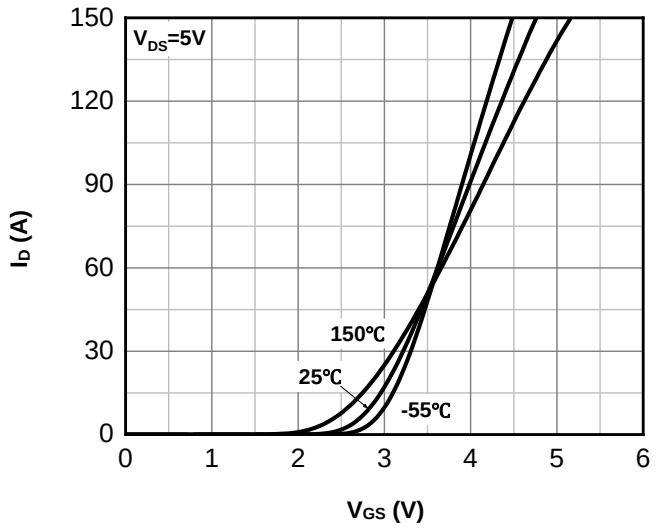


Fig.2 Typ. output characteristics

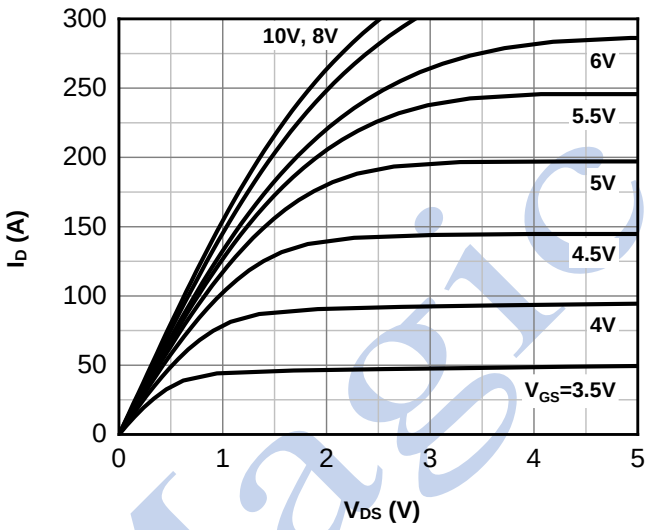


Fig.3 Normalized on-resistance vs drain current

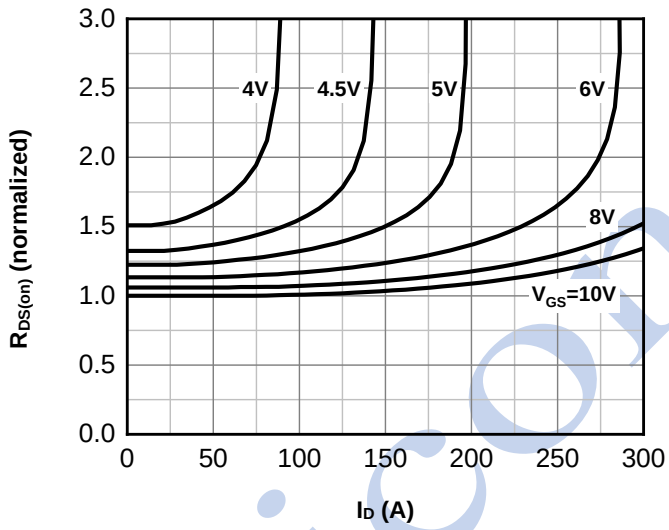


Fig.4 Typ. on-resistance vs gate-source voltage

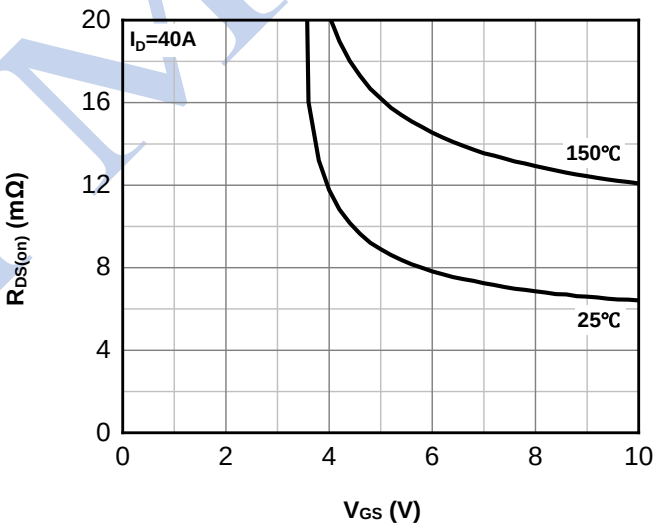


Fig.5 Normalized on-resistance vs junction temperature

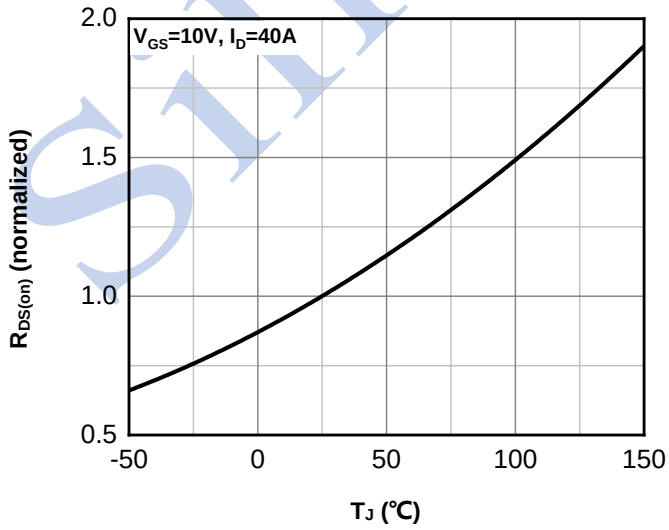


Fig.6 Typ. gate charge

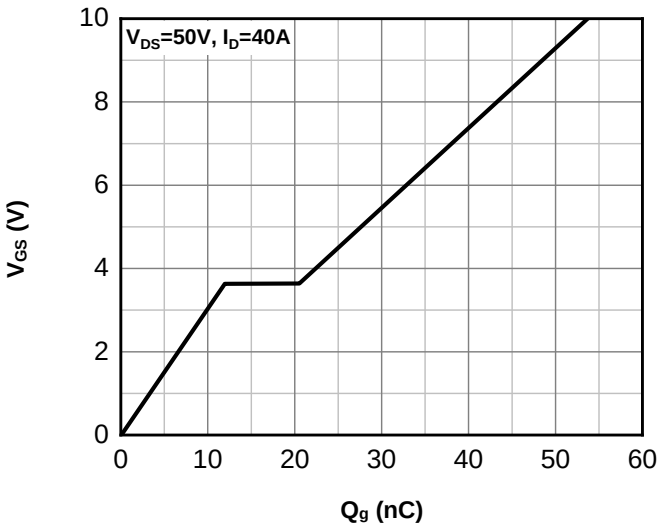


Fig.7 Typ. forward characteristics of body diode

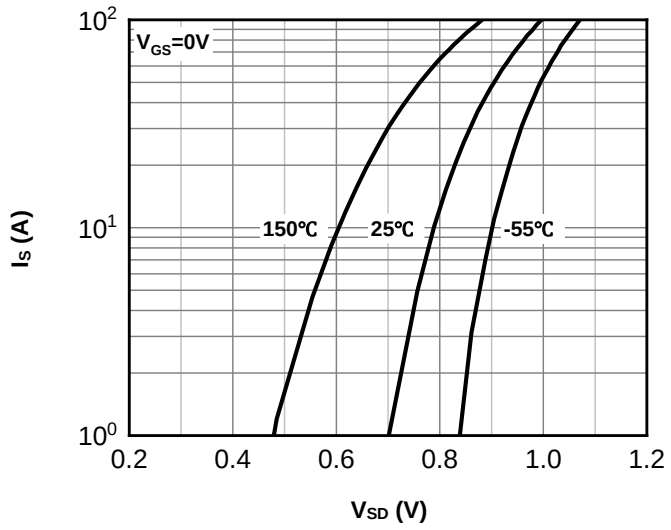


Fig.8 Safe operating area

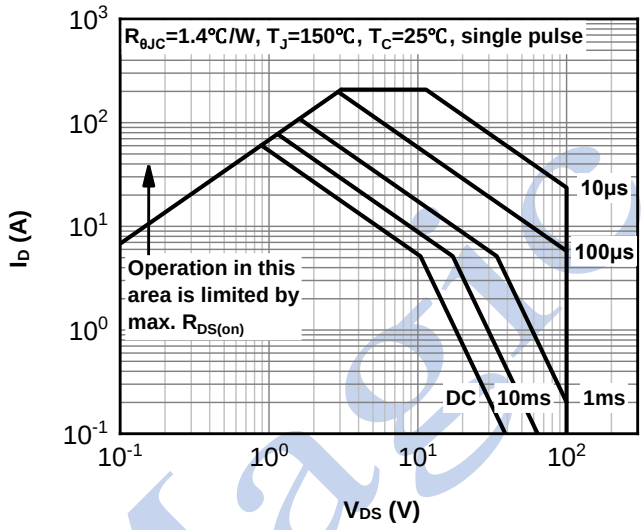


Fig.9 Typ. Capacitance

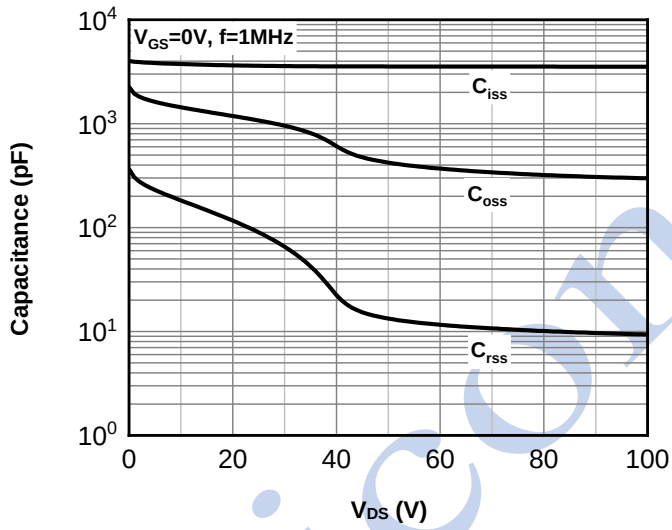


Fig.10 Single pulse maximum power dissipation

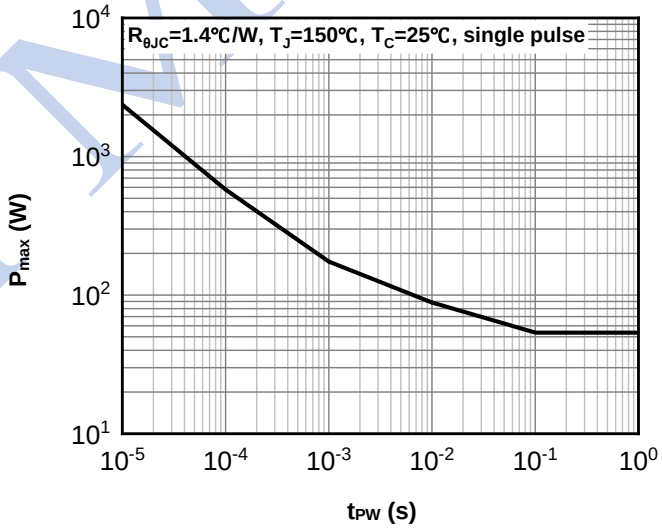


Fig.11 Max. power dissipation vs case temperature

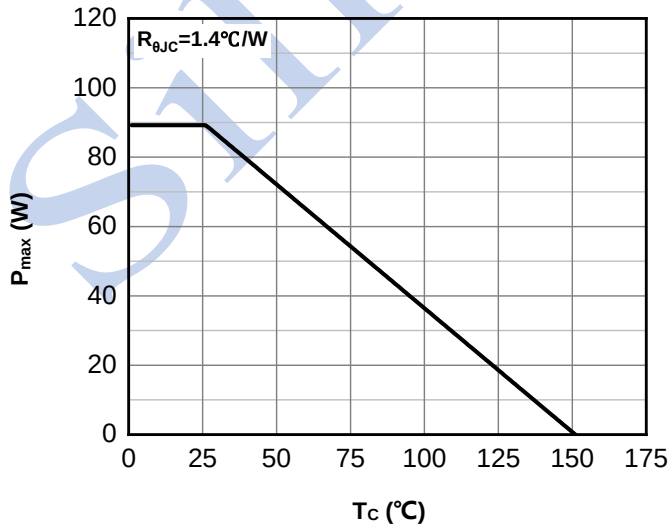


Fig.12 Max. continuous drain current vs case temperature

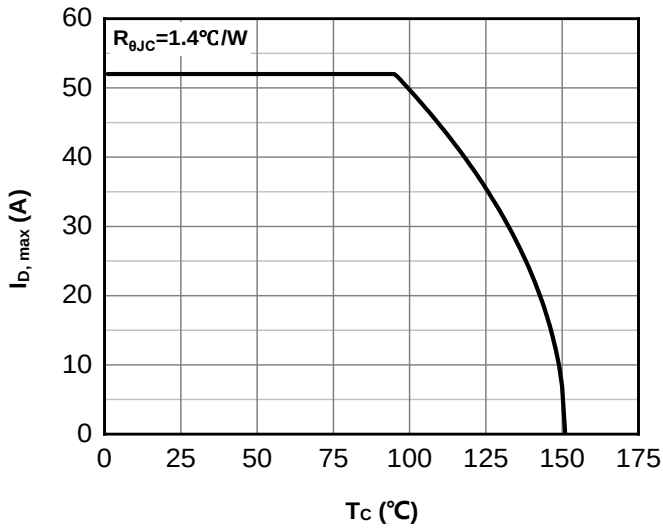


Fig.13 Normalized $V_{(BR)DSS}$ vs junction temperature

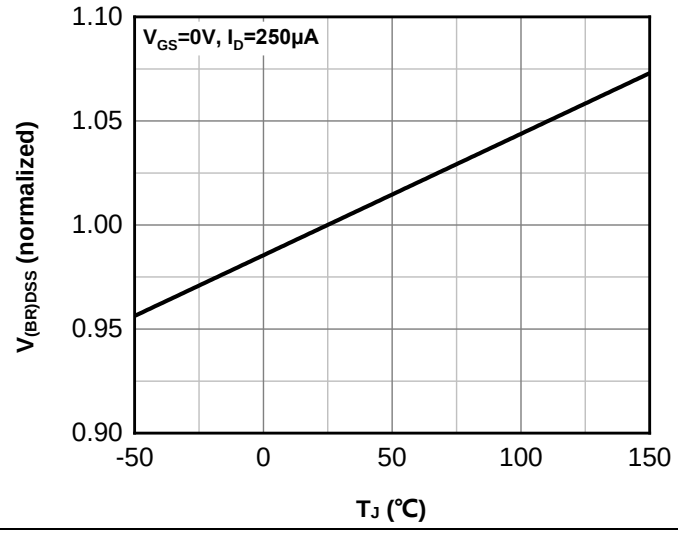


Fig.14 Normalized $V_{GS(th)}$ vs junction temperature

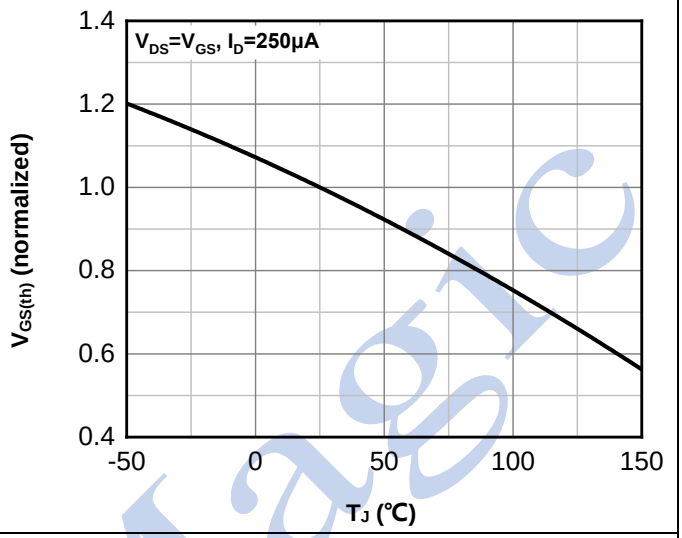
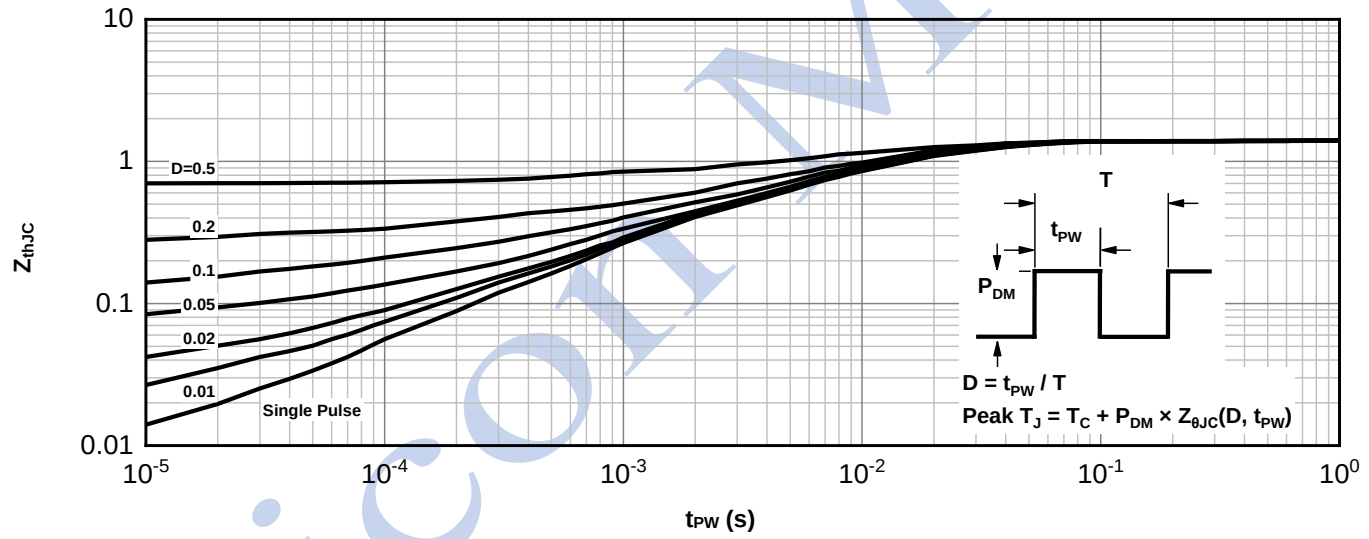
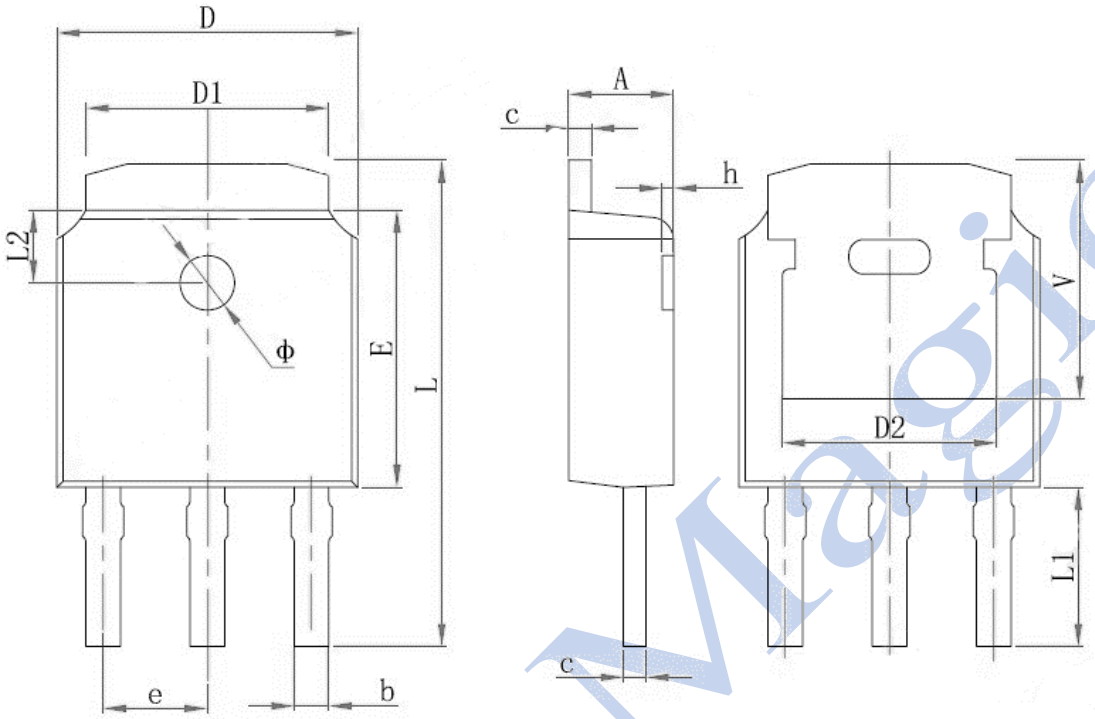


Fig.15 Transient thermal impedance from junction to case



5. Package outline dimensions



Dim	Millimeters		
	Min	Nom	Max
A	2.200	—	2.400
b	0.660	—	0.860
c	0.460	—	0.580
D	6.500	—	6.700
D1	5.100	—	5.460
D2	4.830 REF		
E	6.000	—	6.200
e	2.186	—	2.386
L	10.312	—	10.912
L1	3.300	—	3.700
L2	1.600 REF		
ϕ	1.100	—	1.300
h	0.000	—	0.300
V	5.250 REF		

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