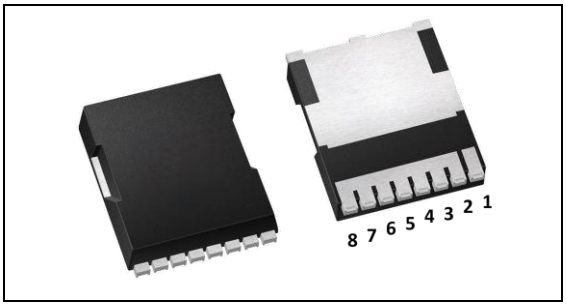
N-Channel 120 V MOSFET

Product summary

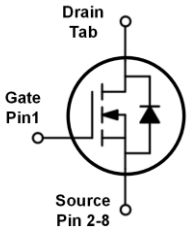
V_{DS} (V)	$R_{DS(on),Typ}$ (mΩ)	I_D (A)
120	1.2 @ V_{GS} = 10V	400 (1)

TOLL



Features

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



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Applications

- DC/DC conversion
- Power switch
- Motor drives

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1. Maximum ratings

Absolute maximum ratings (T_A = 25℃ unless otherwise noted)				
Parameter		**Symbol**	**Limit**	**Unit**
Drain-source voltage		V_{DS}	120	V
Gate-source voltage		V_{GS}	±20	
Continuous drain current	T_C=25℃ (1)	I_D	400	A
	T_C=100℃		280	
	T_A=25℃ (4)		33	
Pulsed drain current(2)		$I_{D,pulse}$	1320	
Avalanche energy, single pulse(3)		E_{AS}	540	mJ
Power dissipation	T_C=25℃	P_D	431	W
	T_A=25℃ (4)		3.1	
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	$R_{\theta JC}$	0.29	°C/W
Thermal resistance, junction-to-ambient (4)	Steady state	$R_{\theta JA}$	40	

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	120			V
Gate-source threshold voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 μA	2.5	3.3	4.1	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} = 120 V, V_{GS} = 0 V			1	μA
Drain-source on-resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 100 A		1.2	1.6	mΩ
Forward transconductance(5)	g_{fs}	V_{DS} = 5 V, I_D = 100 A		260		S
Gate resistance	R_g	f = 1 MHz		1		Ω
Dynamic(5)						
Total gate charge	Q_g	V_{DS} = 50 V, I_D = 100 A, V_{GS} = 10 V		260		nC
Gate-source charge	Q_{gs}			75		
Gate-drain charge	Q_{gd}			76		
Turn-on delay time	$t_{d(on)}$	V_{DS} = 50 V, I_D = 100 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		81		ns
Rise time	t_r			178		
Turn-off delay time	$t_{d(off)}$			167		
Fall time	t_f			68		
Input capacitance	C_{iss}	V_{DS} = 50 V, V_{GS} = 0 V, f = 1 MHz		15800		pF
Output capacitance	C_{oss}			1930		
Reverse transfer capacitance	C_{rss}			75		
Reverse Diode Characteristics(5)						
Diode forward voltage	V_{SD}	V_{GS} = 0 V, I_F = 100 A		0.85	1.1	V
Reverse recovery time	t_{rr}	V_{DS} = 50 V, I_F = 100 A, di/dt = 100 A/μs		92		ns
Reverse recovery charge	Q_{rr}			200		nC

Notes

(1) Package limited.

(2) Pulse width limited by maximum junction temperature.

(3) V_{DS} = 75 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

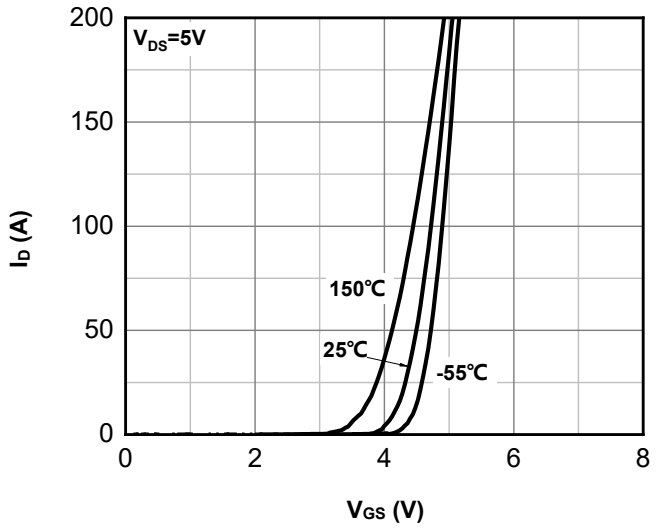


Fig.2 Typ. output characteristics

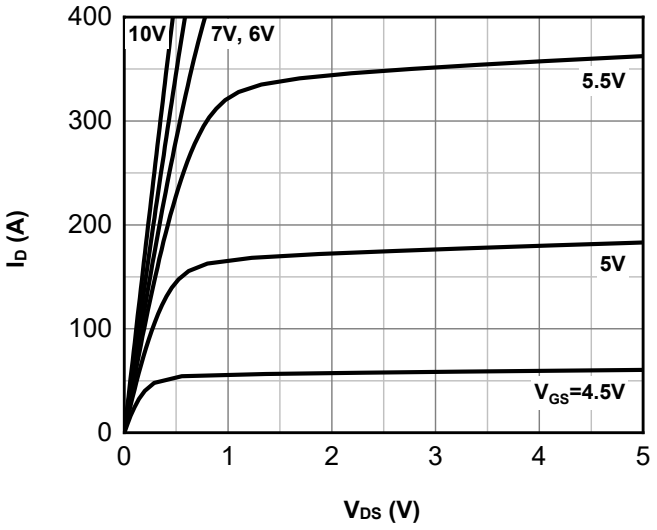


Fig.3 Normalized on-resistance vs drain current

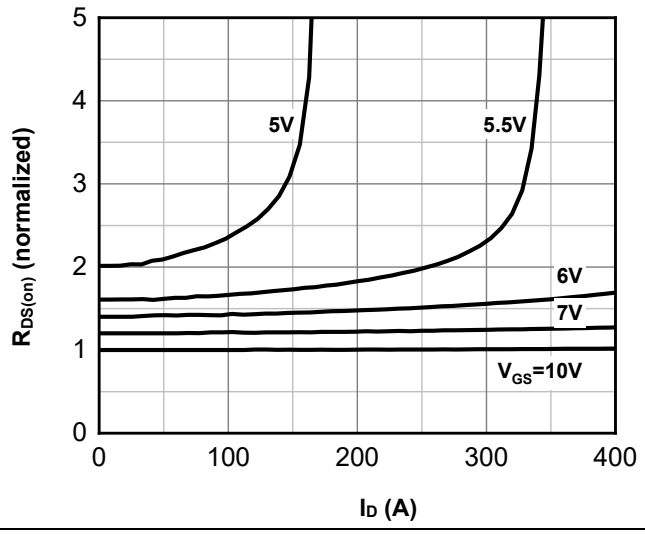


Fig.4 Typ. on-resistance vs gate-source voltage

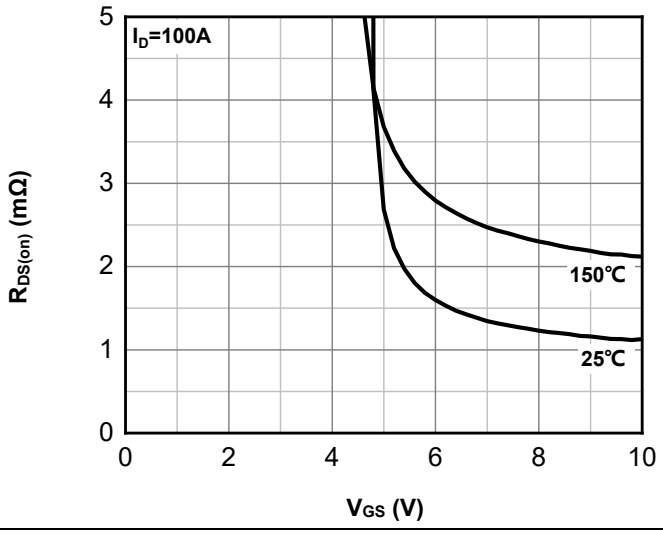


Fig.5 Normalized on-resistance vs junction temperature

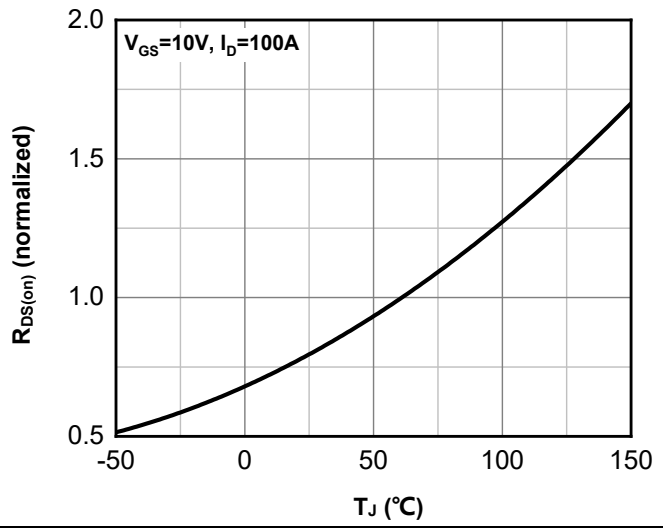


Fig.6 Typ. gate charge

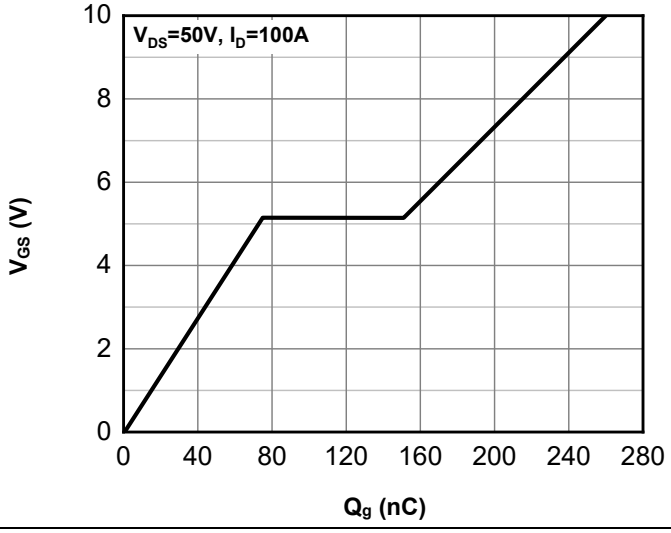


Fig.7 Typ. forward characteristics of body diode

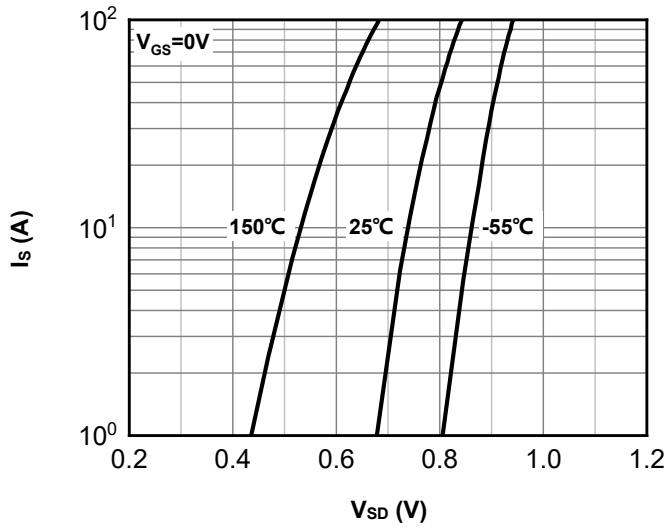


Fig.8 Safe operating area

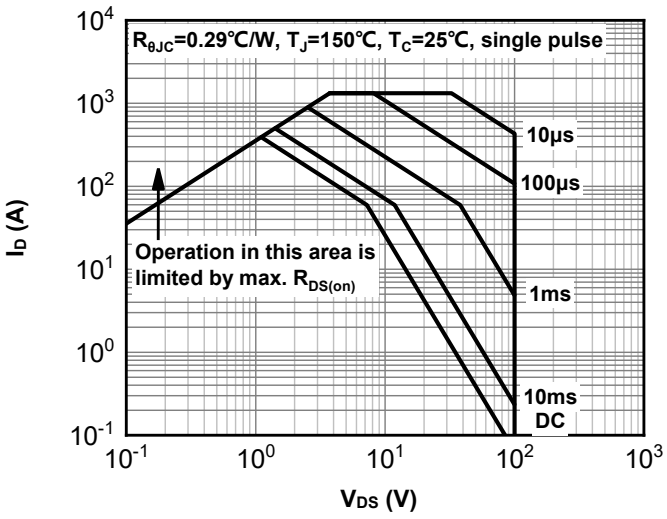


Fig.9 Typ. Capacitance

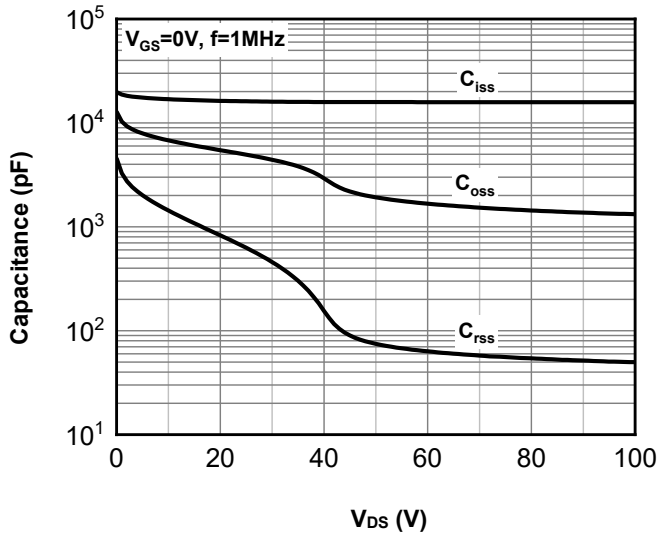


Fig.10 Single pulse maximum power dissipation

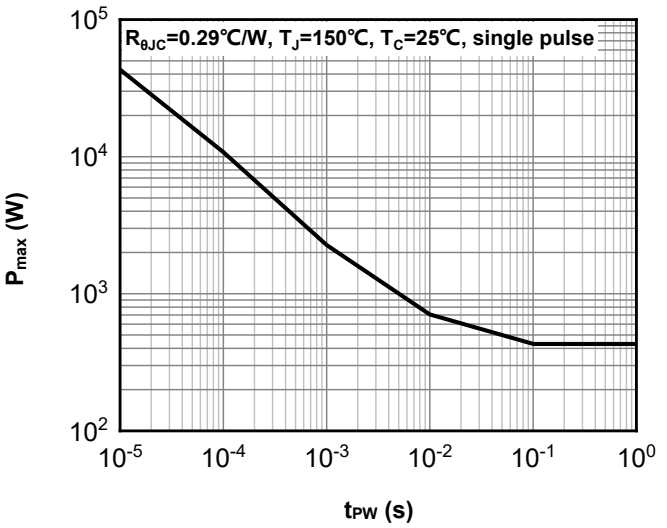


Fig.11 Max. power dissipation vs case temperature

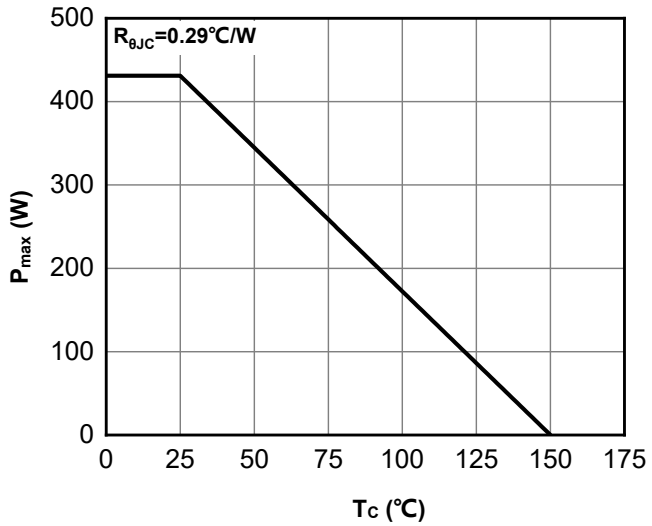


Fig.12 Max. continuous drain current vs case temperature

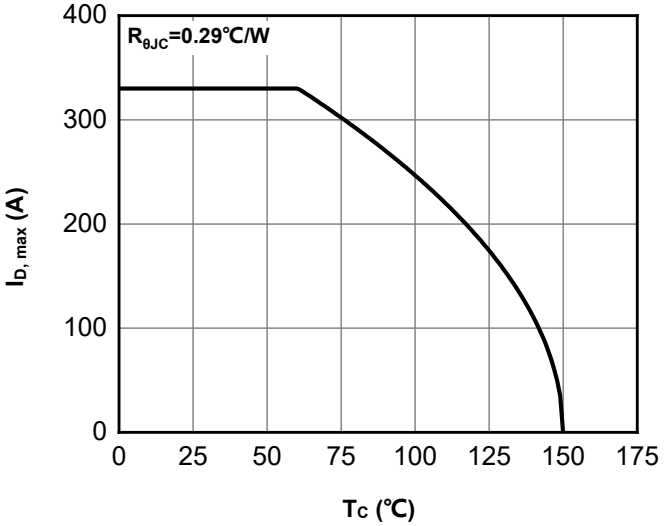


Fig.13 Normalized $V_{(BR)DSS}$ vs junction temperature

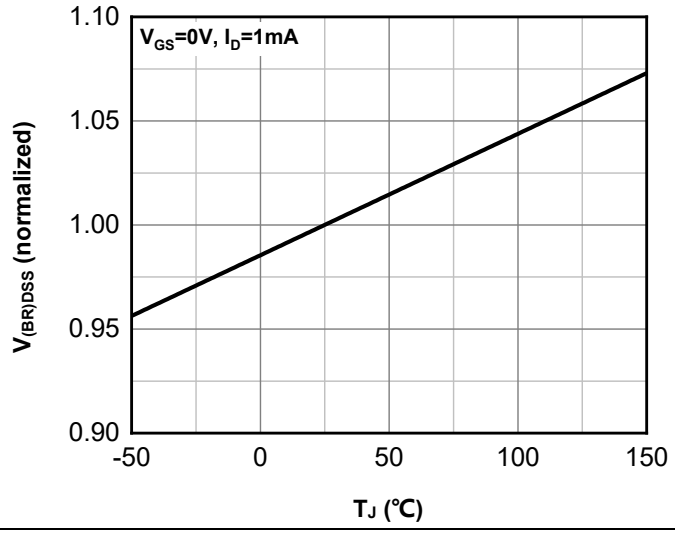


Fig.14 Normalized $V_{GS(th)}$ vs junction temperature

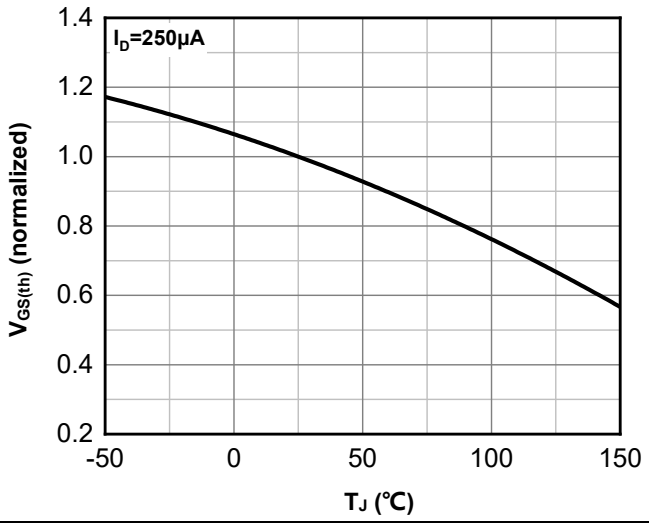
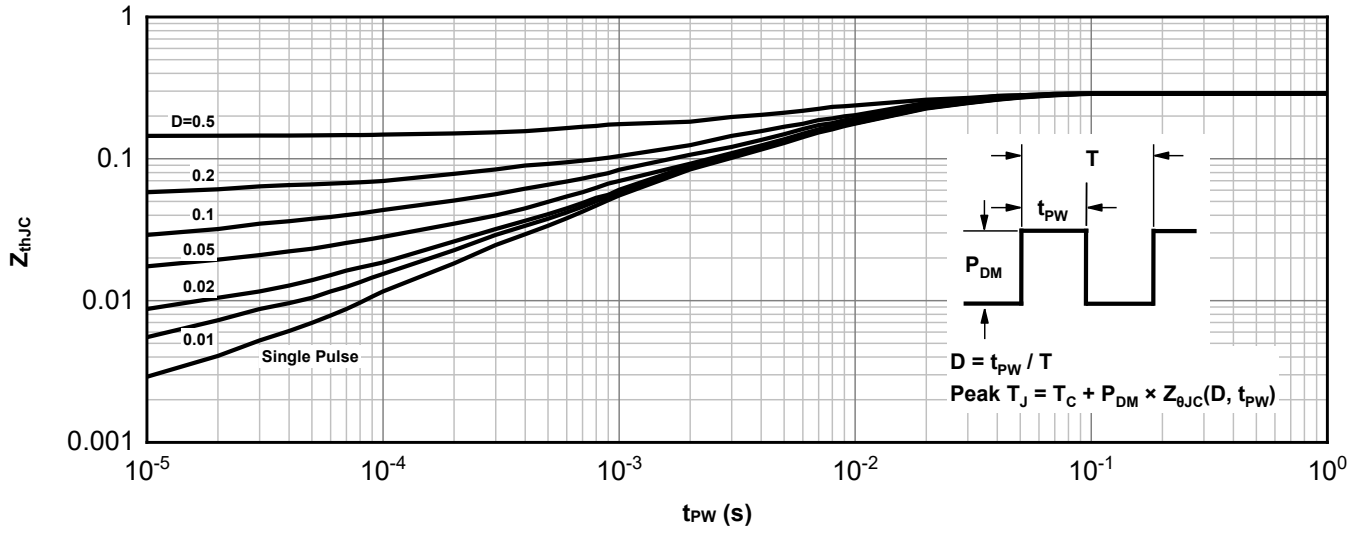
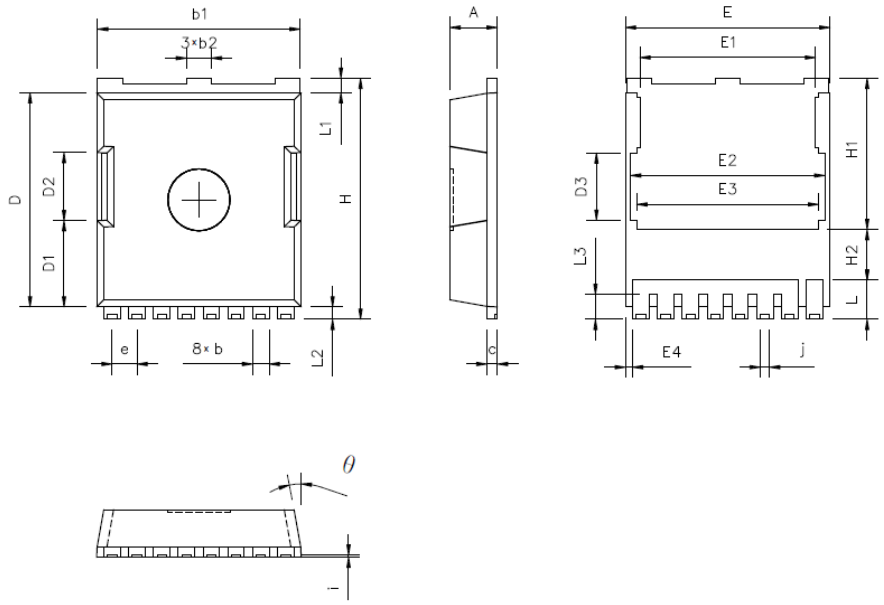


Fig.15 Transient thermal impedance from junction to case



5. Package outline dimensions



Dim	Millimeters		
	Min	Nom	Max
A	2.20	-	2.40
b	0.70	-	0.90
b1	9.70	-	9.90
b2	1.20 REF		
c	0.40	-	0.60
D	10.28	-	10.48
D1	4.08	-	4.28
D2	3.20	-	3.40
D3	3.16	-	3.36
E	9.80	-	10.00
E1	8.40	-	8.60
E2	9.30	-	9.50
E3	8.80 REF		
E4	0.25	-	0.45
e	1.20 BASIC		
H	11.58	-	11.78
H1	7.23	-	7.43
H2	2.45 REF		
i	0.10	-	-
j	0.45 REF		
L	1.60	-	2.10
L1	0.60	-	0.80
L2	0.50	-	0.70
L3	1.05	-	1.30
θ	10° REF		