N-Channel Enhancement Mode Power MOSFET

Description

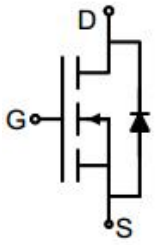
The GT013N04TLH uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge. It can be used in a wide variety of applications.

General Features

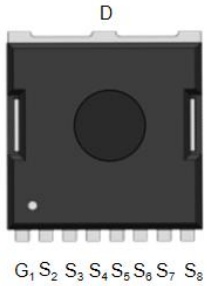
- V_{DS} 40V
- I_D (at V_{GS} = 10V) 285A
- $R_{DS(ON)}$ (at V_{GS} = 10V) < 1.3mΩ
- 100% Avalanche Tested
- RoHS Compliant

Application

- Power switch
- DC/DC converters



Schematic diagram



TOLL-8L

Ordering Information

Device	Package	Marking	Packaging
GT013N04TLH	TOLL-8L	GT013N04H	2000pcs/Reel

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	40	V
Continuous Drain Current	T_C = 25ºC	I_D	285	A
	T_C = 100ºC		180	
Pulsed Drain Current (note1)		I_{DM}	1140	A
Gate-Source Voltage		V_{GS}	±20	V
Power Dissipation		P_D	156	W
Single pulse avalanche energy （note2）		E_{AS}	440	mJ
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 To 150	ºC

Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	R_{thJA}	50	ºC/W
Maximum Junction-to-Case	R_{thJC}	0.8	ºC/W

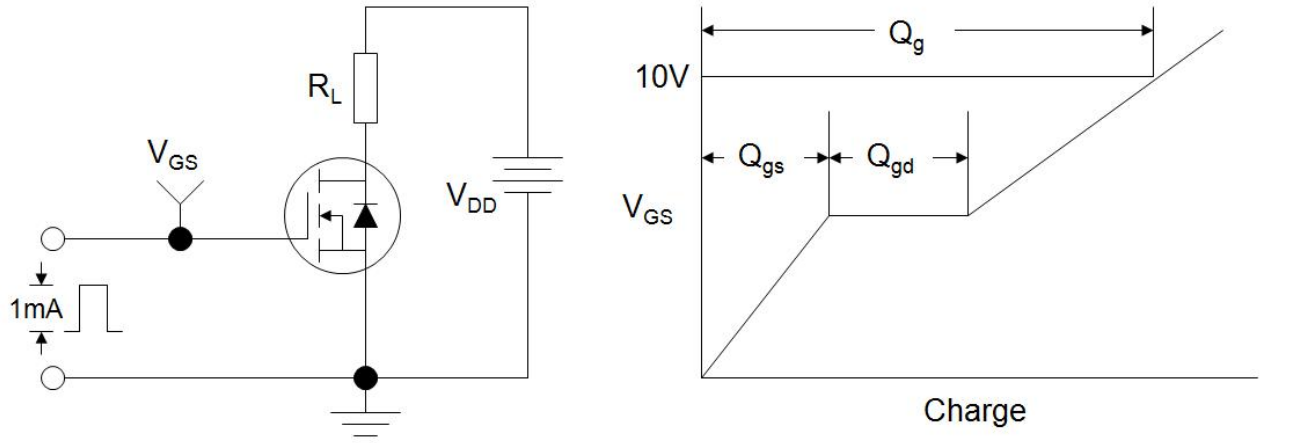
Specifications T_J = 25ºC, unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
Static Parameters						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	40	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 40V, V_{GS} = 0V	--	--	1	μA
Gate-Source Leakage	I_{GSS}	V_{GS} = ±20V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.0	3.0	4.0	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 50A	--	1.0	1.3	mΩ
Forward Transconductance	g_{FS}	V_{GS} = 5V, I_D = 50A	--	80	--	S
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 20V, f = 0.6MHz	--	5400	--	pF
Output Capacitance	C_{oss}		--	3600	--	
Reverse Transfer Capacitance	C_{rss}		--	150	--	
Total Gate Charge	Q_g	V_{DD} = 20V, I_D = 50A, V_{GS} = 10V	--	84	--	nC
Gate-Source Charge	Q_{gs}		--	28	--	
Gate-Drain Charge	Q_{gd}		--	17	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 20V, I_D = 50A, R_G = 1.6Ω	--	13	--	ns
Turn-on Rise Time	t_r		--	7	--	
Turn-off Delay Time	$t_{d(off)}$		--	53	--	
Turn-off Fall Time	t_f		--	9	--	
Drain-Source Body Diode Characteristics						
Continuous Body Diode Current	I_S	T_C = 25ºC	--	--	285	A
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 50A, V_{GS} = 0V	--	--	1.2	V
Reverse Recovery Charge	Qrr	I_F = 50A, V_{GS} = 0V di/dt=100A/us	--	115	--	nC
Reverse Recovery Time	Trr		--	35	--	ns

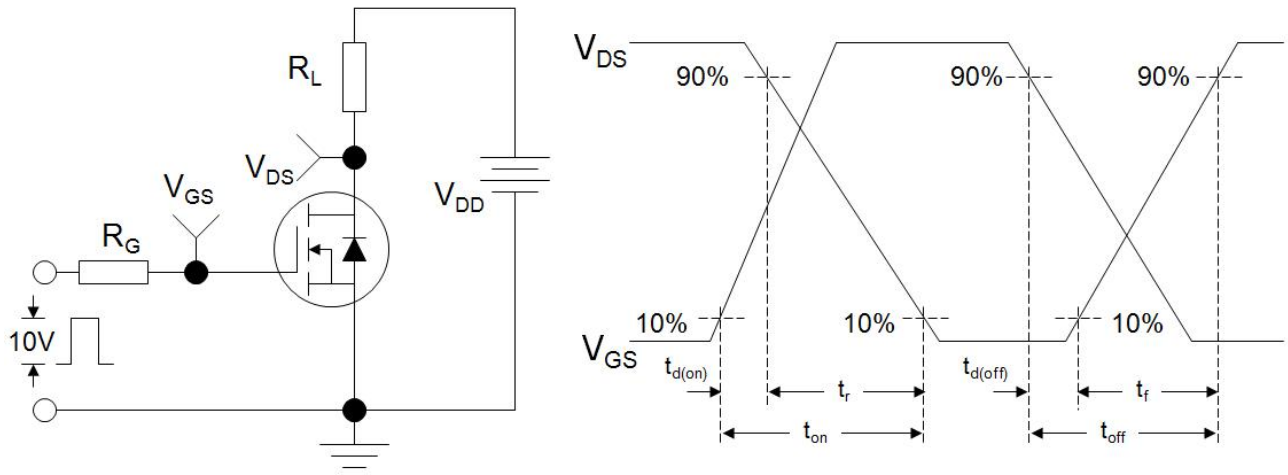
Notes

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. EAS condition : Tj=25℃ ,VDD=40V,VGS=10V,L=0.5mH,Rg=25Ω
   The table shows the minimum avalanche energy, which is 1225mJ when the device is tested until failure
3. Identical low side and high side switch with identical R_G

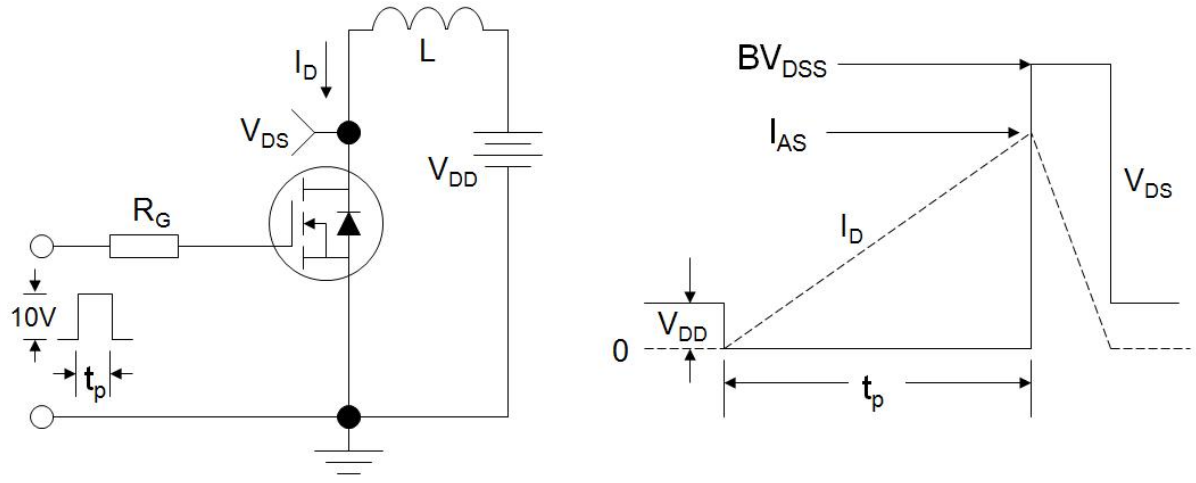
Gate Charge Test Circuit



Switch Time Test Circuit



EAS Test Circuit



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

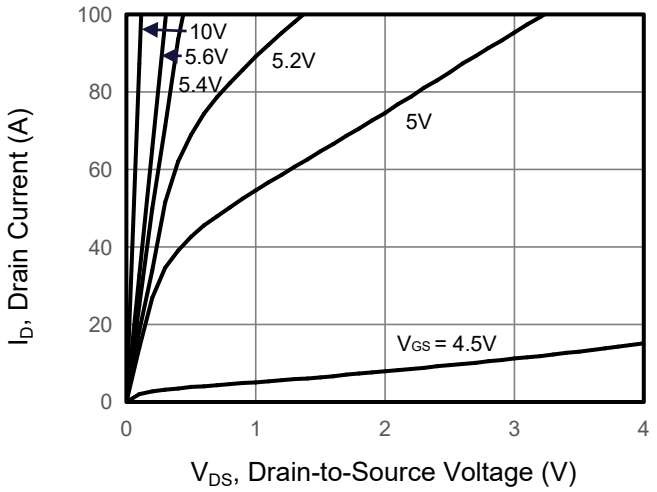


Figure 2. Transfer Characteristics

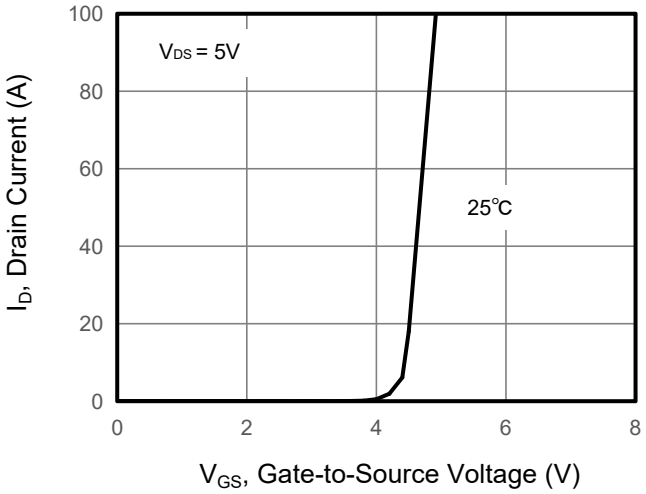


Figure 3. Drain Source On Resistance

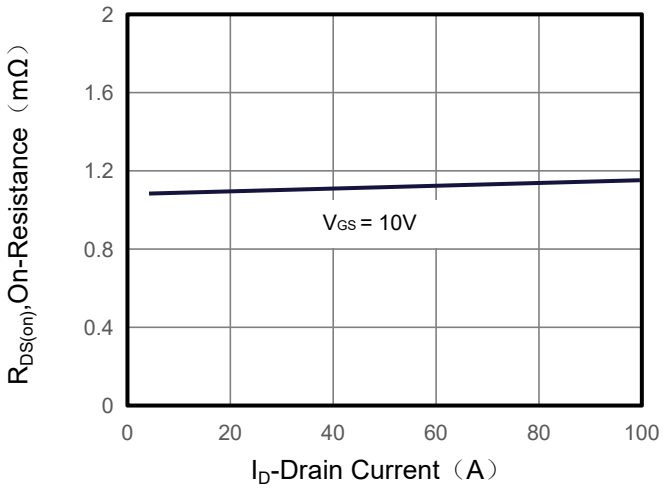


Figure 4. Gate Charge

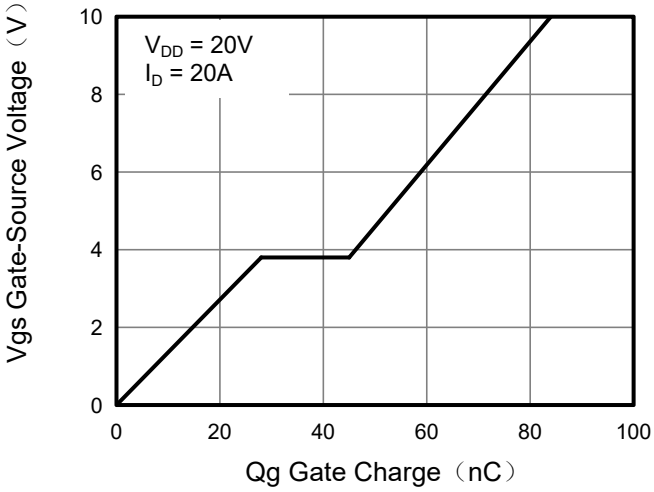


Figure 5. Capacitance

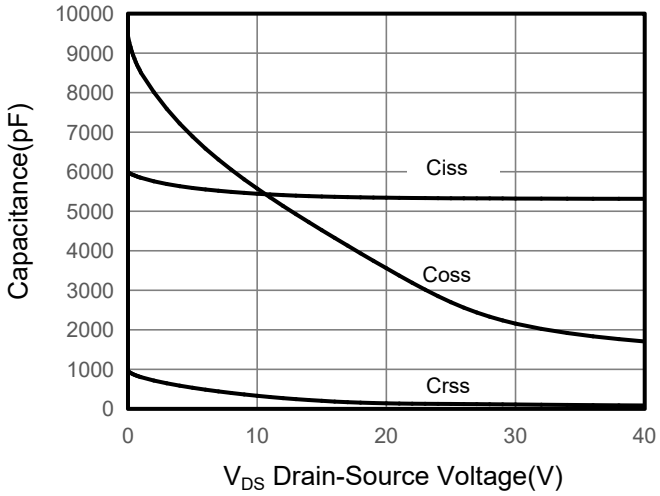
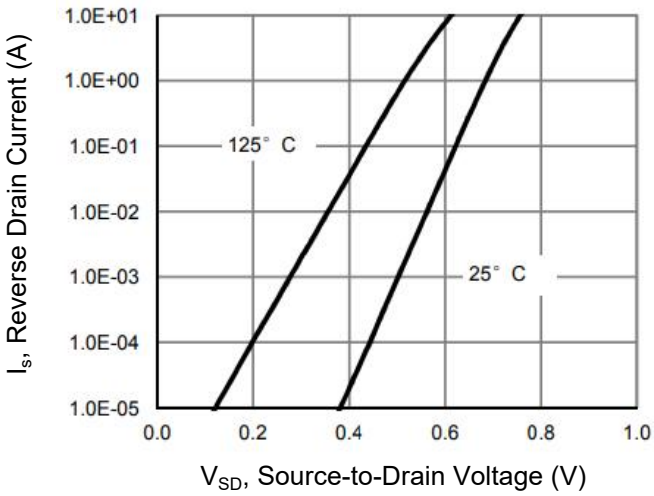


Figure 6. Source-Drain Diode Forward



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. Drain-Source On-Resistance

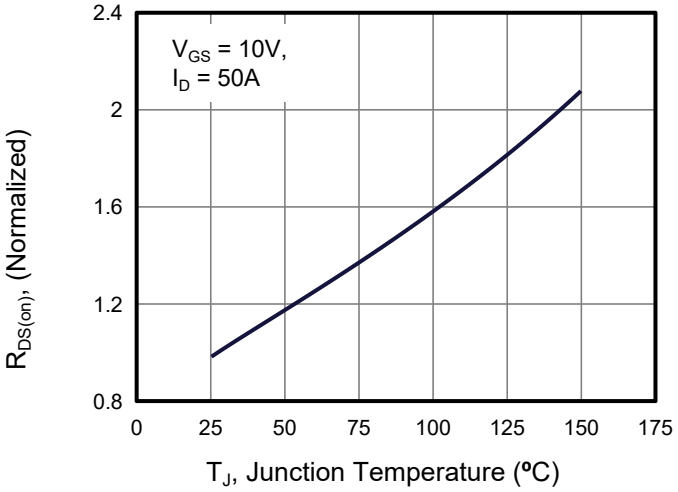


Figure 8. Safe Operation Area

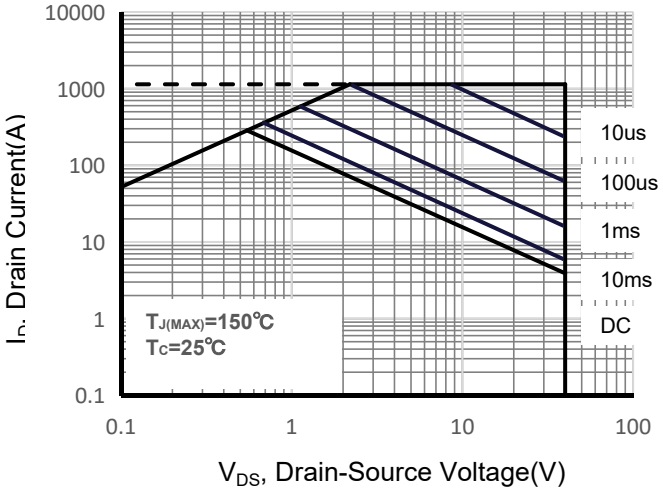


Figure 9. Maximum Continuous Drain Current vs Case Temperature

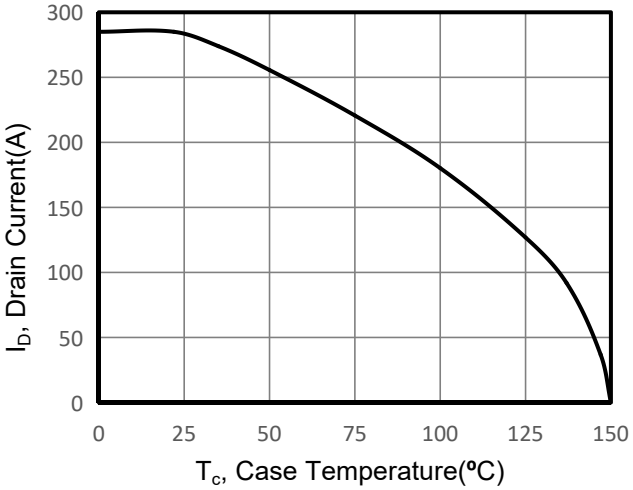
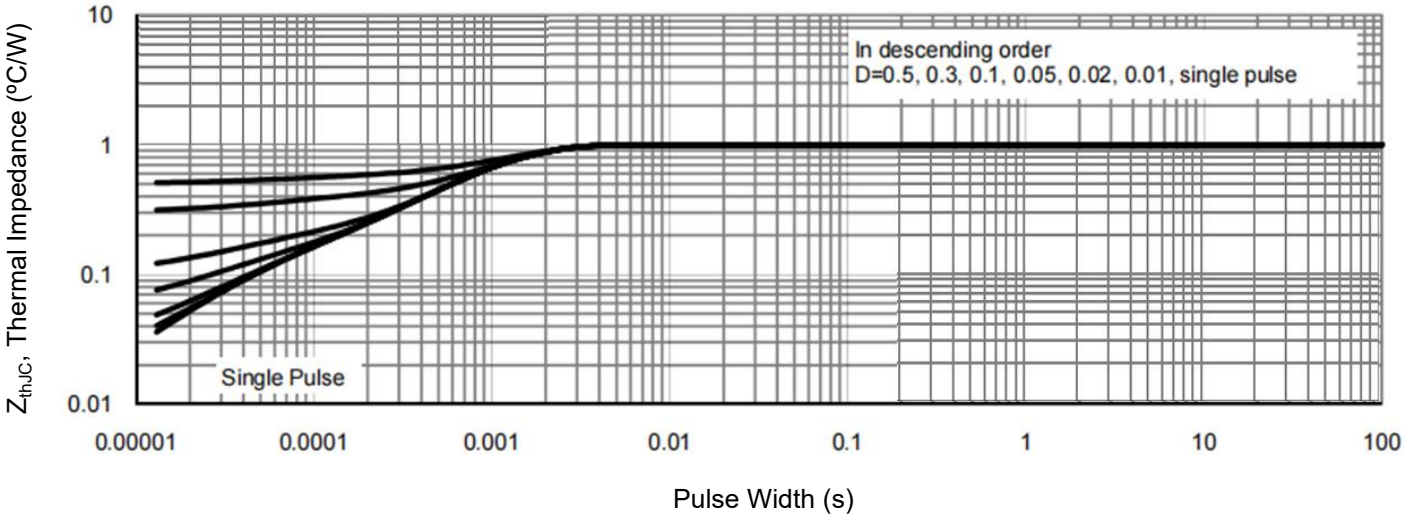
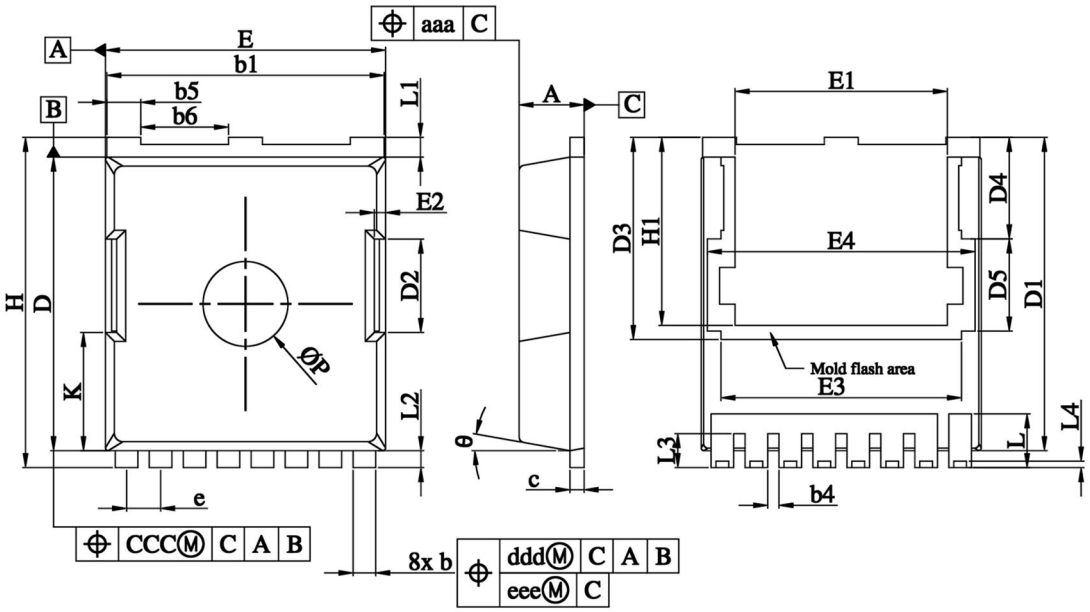
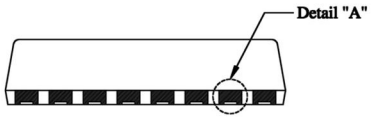


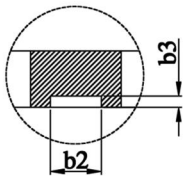
Figure 10. Normalized Maximum Transient Thermal Impedance



TOLL-8L Package Information







SYMBOL	COMMON MILLIMETER			SYMBOL	COMMON MILLIMETER		
	MIN.	NOMINAL	MAX.		MIN.	NOMINAL	MAX.
A	2.20	2.30	2.40	E2	0.30	0.40	0.50
b	0.70	0.80	0.90	E3		8.50	
b1	9.70	9.80	9.90	E4		9.46	
b2	0.36	0.45	0.55	H	11.50	11.68	11.85
b3	0.05	0.100	/	H1	6.55	6.65	6.75
b4	0.30	0.40	0.50	K	4.08	4.18	4.28
b5	1.10	1.20	1.30	L	1.60	1.90	2.10
b6	3.00	3.10	3.20	L1	0.50	0.70	0.90
c	0.40	0.50	0.60	L2	0.50	0.60	0.70
D	10.28	10.38	10.55	L3	1.00	1.20	1.30
D1	10.98	11.08	11.18	L4	0.13	0.23	0.33
D2	3.20	3.30	3.40	P	2.85	3.00	3.15
D3		7.15		θ		10° REF	
D4		3.59		aaa		0.20	
D5		3.26		ccc		0.20	
e	1.10	1.20	1.30	ddd		0.25	
E	9.80	9.90	10.00	eee		0.20	
E1	7.40	7.50	7.60				