N-Ch 40V Fast Switching MOSFETs

Features

- Split Gate Trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$

Product Summary

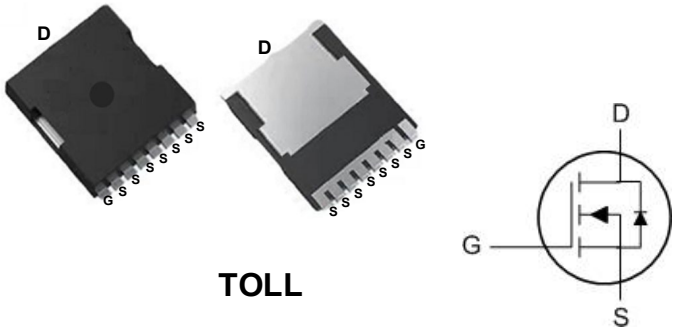
Green

BVDSS	RDSON	ID
40V	1.0mΩ	300A

Applications

- DC-DC Converters
- Power management functions
- Synchronous-rectification applications

TOLL Pin Configuration



TOLL

■ 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	V
Drain Current （Silicon limited）		I_D	300	A
Drain Current [A]	T_C=25℃	I_D	200	A
	T_C=100℃		82	
Pulsed Drain Current [B]		I_{DM}	690	A
Avalanche energy [C]		E_{AS}	500	mJ
Total Power Dissipation [D]		P_D	220	W
Thermal Resistance Junction-to-Case		$R_{\theta JC}$	1.0	℃/ W
Thermal Resistance Junction-to-Ambient [E]		$R_{\theta JA}$	35	
Junction and Storage Temperature Range		T_J ,T_{STG}	-55～+150	℃

■ Electrical Characteristics (T_J=25℃ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}= 0V, I_D=250μA	40	48		V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V			1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}= ±20V, V_{DS}=0V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}= V_{GS}, I_D=250μA	1.2	1.8	2.5	V
Static Drain-Source On-Resistance	$R_{DS(ON)}$	V_{GS}= 10V, I_D=20A		1.0	1.4	mΩ
		V_{GS}= 4.5V, I_D=20A		1.6	2.3	
Gate Resistance	R_g	V_{GS}=0V,V_{DS} Open,f=1MHZ		2.7		Ω
Maximum Body-Diode Continuous Current	I_S				300	A
Dynamic Parameters						
Input Capacitance	C_{iss}	V_{DS}=25V,V_{GS}=0V,f=300KHZ		8300		pF
Output Capacitance	C_{oss}			1510		
Reverse Transfer Capacitance	C_{rss}			130		
Switching Parameters						
Total Gate Charge	Q_g	V_{GS}=10V,V_{DS}=32V,I_D=20A		127		nC
Gate-Source Charge	Q_{gs}			35		
Gate-Drain Charge	Q_{gd}			26		
Reverse Recovery Chrage	Q_{rr}	I_F=25A, di/dt=100A/us		163		
Reverse Recovery Time	t_{rr}			100		ns
Turn-on Delay Time	$t_{d(on)}$	V_{GS}=10V,V_{DD}=20V,I_D=25A R_{GEN}=2Ω		22.5		
Turn-on Rise Time	t_r			6.7		
Turn-off Delay Time	$t_{d(off)}$			80.3		
Turn-off fall Time	t_f			26.9		

Note:

A. The maximum current rating is package limited.
B. Repetitive rating; pulse width limited by max. junction temperature.
C. V_{DD}=32 V, R_G=25 Ω, L=0.5mH, starting T_j=25 ℃.
D. P_D is based on max. junction temperature, using junction-case thermal resistance.
E. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with Ta=25 ℃.

■ Typical Performance Characteristics

Figure.1 Typical Output Characteristics

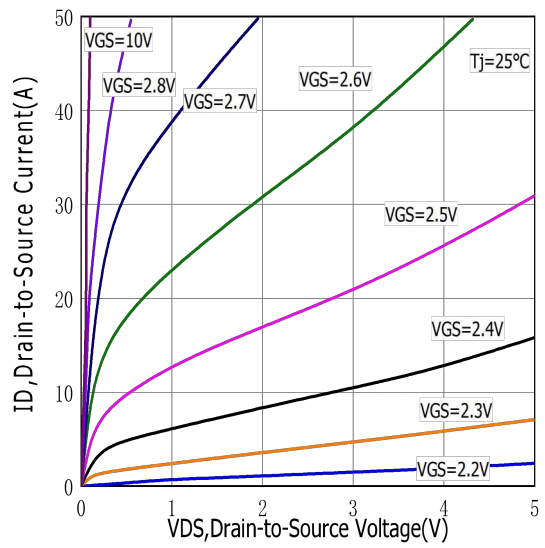


Figure.2 Typical Gate Charge vs Gate to Source Voltage

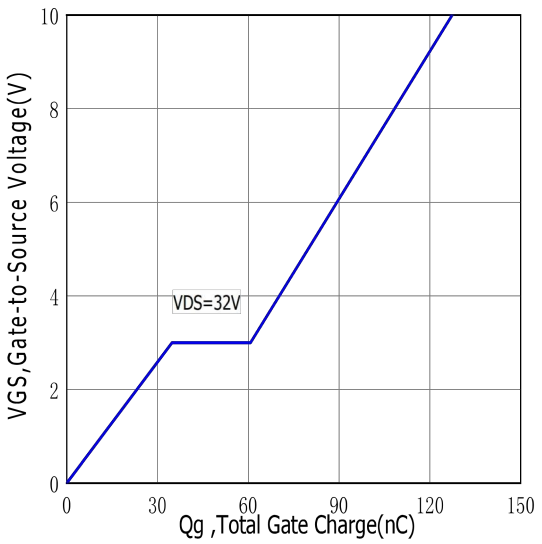


Figure.3 Typical Body Diode Transfer Characteristics

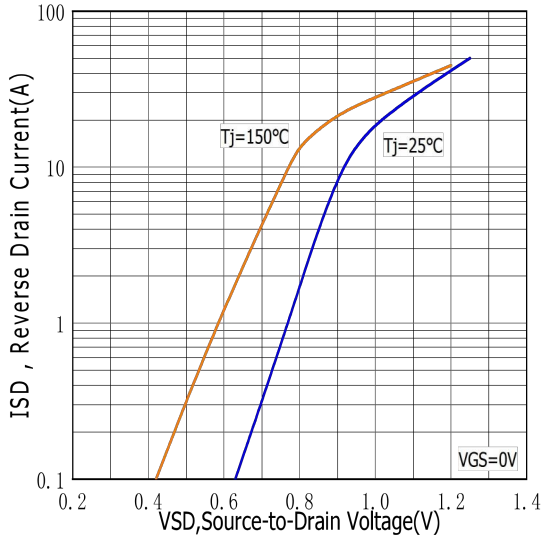


Figure.4 Typical Capacitance vs Drain to Source Voltage

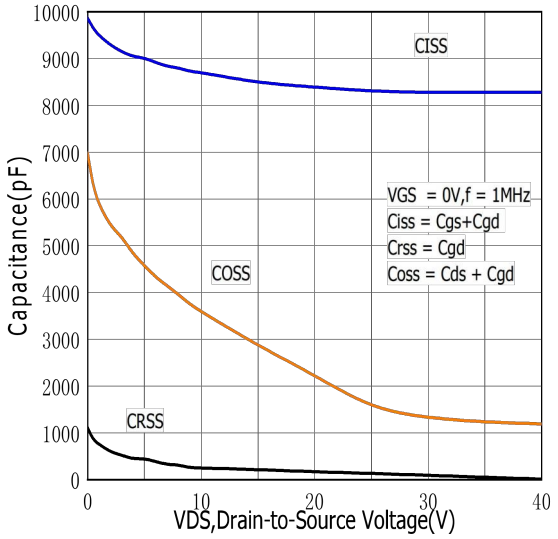


Figure.5 Typical Breakdown Voltage vs Junction Temperature

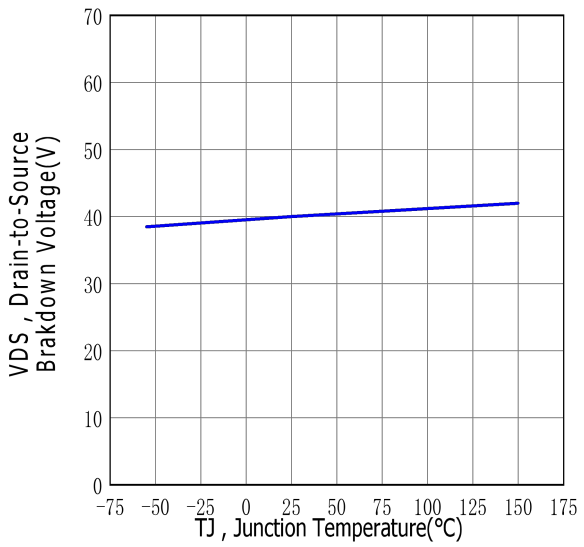


Figure.6 Typical Drain to Source on Resistance vs Junction Temperature

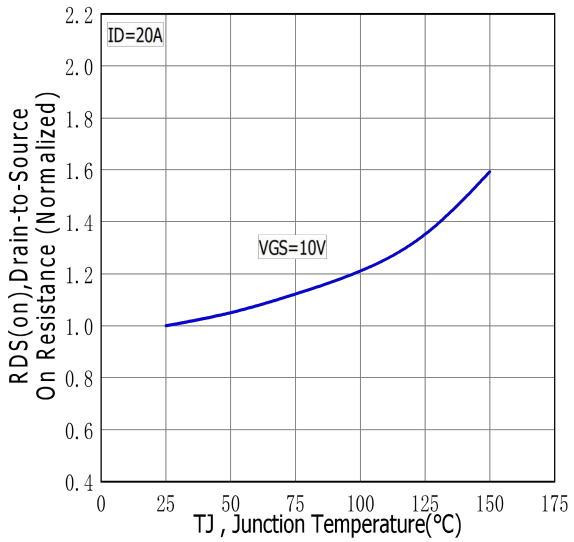


Figure.7 Maximum Forward Bias Safe Operating Area

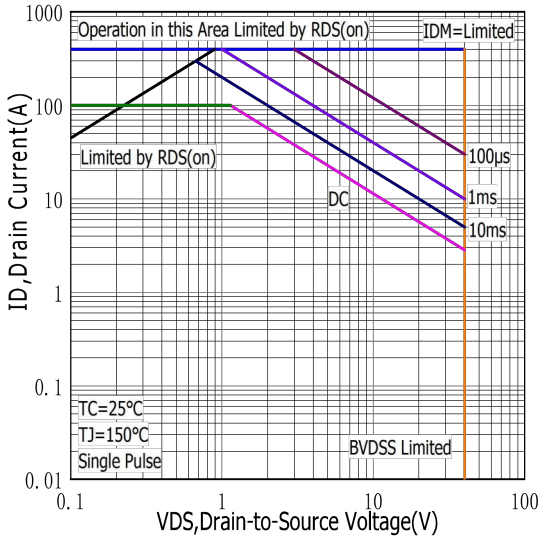
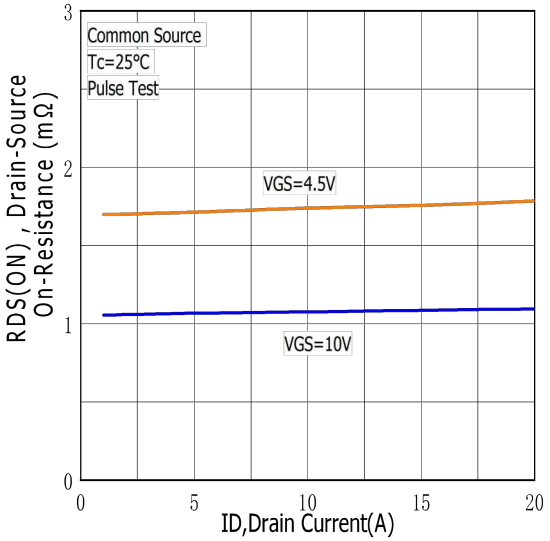


Figure.8 Typical Drain to Source ON Resistance vs Drain Current



■ Typical Performance Characteristics

Figure.9 Maximum EAS vs Channel Temperature

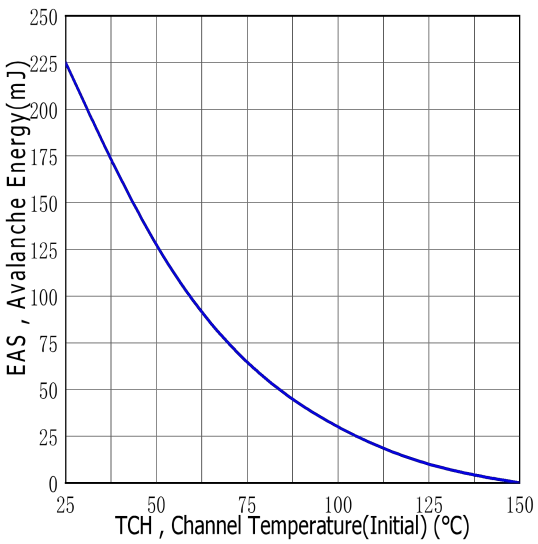


Figure.10 Typical Threshold Voltage vs Case Temperature

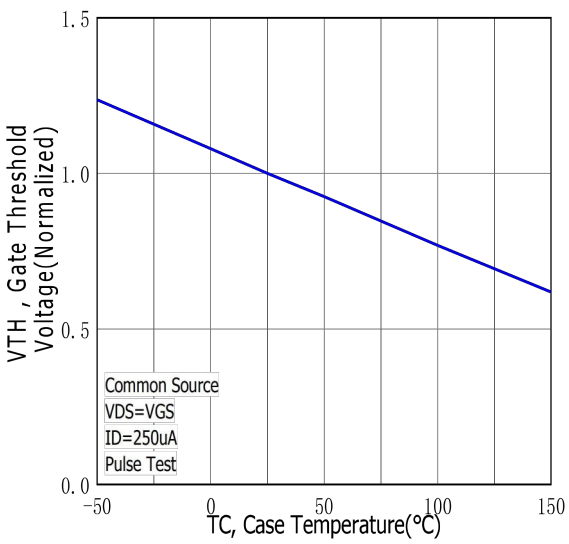


Figure.11 Typical Transfer Characteristics

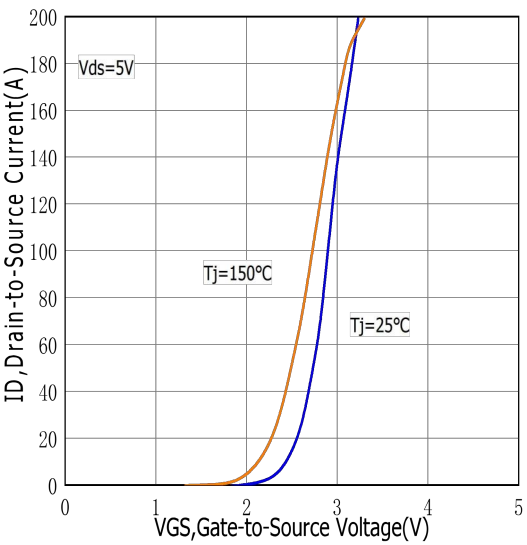


Figure.12 Maximum Power Dissipation vs Case Temperature

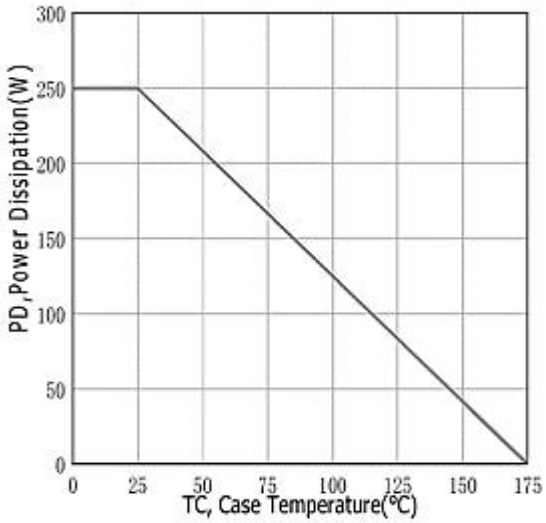
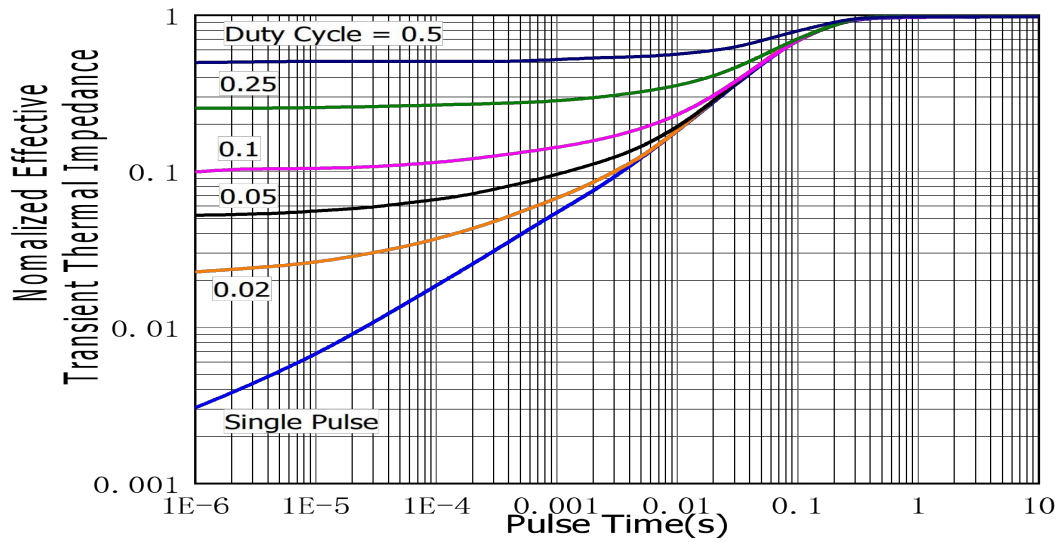


Figure.13 Maximum Effective Thermal Impedance , Junction to Case



■ Test circuits and waveforms

Figure A: Gate Charge Test Circuit & Waveforms

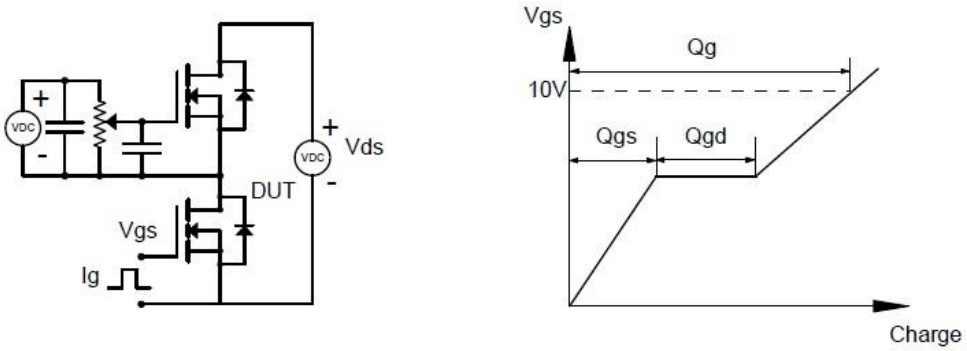


Figure B: Resistive Switching Test Circuit & Waveforms

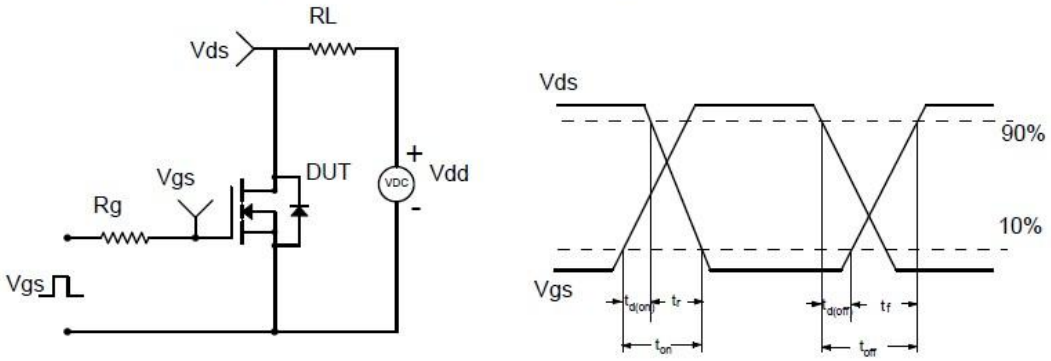


Figure C: Unclamped Inductive Switching (UIS) Test

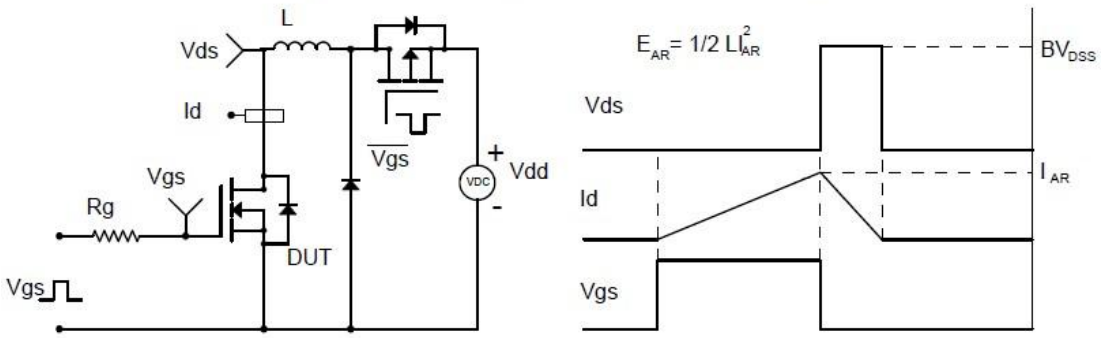
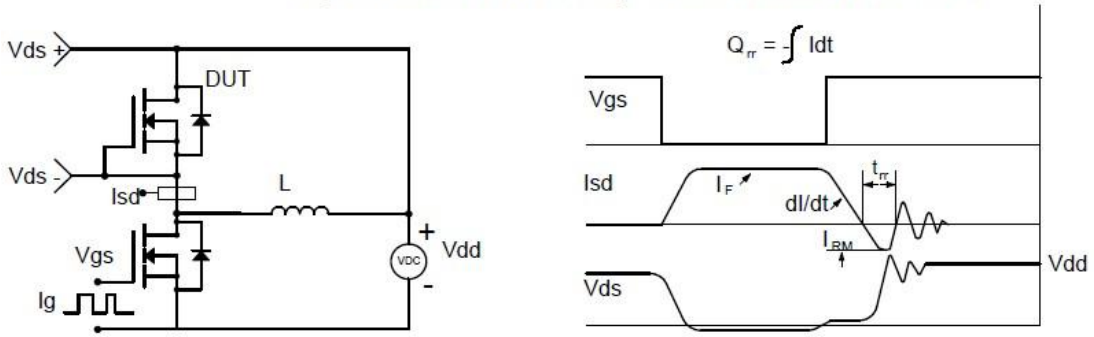
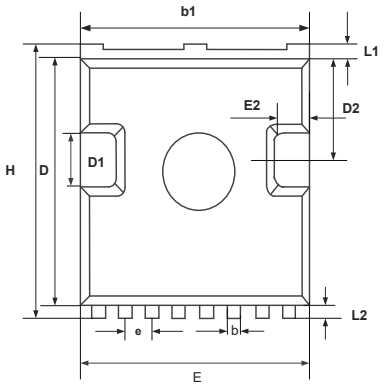


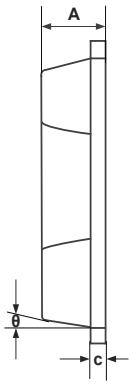
Figure D: Diode Recovery Test Circuit & Waveforms



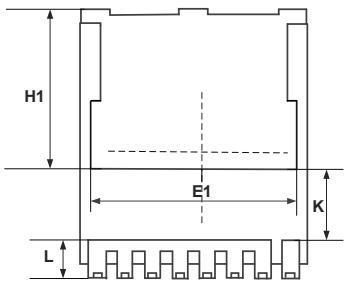
Mechanical Dimensions for TOLL-8L



TOP VIEW



SIDE VIEW



BOTTTOM VIEW

COMMON DIMENSIONS

SYMBOL	MM	
	MIN	MAX
A	2.20	2.40
b	0.60	0.90
b1	9.70	9.90
c	0.40	0.60
D	10.20	10.60
D1	3.10	3.50
D2	4.45	4.75
E	9.70	10.10
E1	7.80BSC	
E2	0.50	0.70
e	1.200 BSC	
H	11.45	11.90
H1	6.75 BSC	
K	3.10 REF	
L	1.70	2.10
L1	0.60	0.80
L2	0.50	0.70
θ	10° REF	