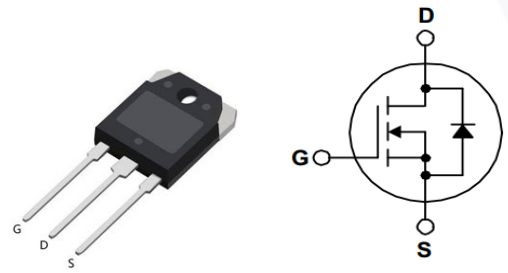


TH23N50PB

500V 23A 189mΩ Silicon N-Channel Planar Power MOSFET

Features of this MOSFET are 150°C operating junction temperature and high repetitive peak current capability. These features combine to make this MOSFET a highly efficient, robust and reliable device for PDP driving applications.



Package view and circuit symbol

General Features

- $V_{DS}=500V, I_D=23A$
- Low ON Resistance, $R_{DS(on), typ.}=189m\Omega @ V_{GS}=10V, I_D=11.5A$
- Low reverse transfer capacitance
- Low Qg for fast response
- Short fall & rise times for fast switching
- 100% single pulse avalanche energy Test

Applications

- Power switching application
- Digital amplifier
- Adapter and charger

Key Performance Parameters

Parameter	Value	Unit
$V_{DSS}, \min @ T_J = 25^\circ C$	500	V
$T_J, \text{maximum junction temperature}$	150	°C
$I_D @ T_C = 25^\circ C (\text{Silicon Limit})$	23	A
$I_{D,pulse} @ T_C = 25^\circ C, t_p \text{ limited by } T_{Jmax.}$	92	A
$R_{DS(on), typ.} @ T_J = 25^\circ C, V_{GS} = 10 V$	189	mΩ
$E_{AS}, typ. @ T_J = 25^\circ C$	1935	mJ



Marking Information

Product Name	Package	Marking
TH23N50PB	TO-3PN	TH23N50PB

Table of contents

Key Performance Parameters	1
Marking Information	1
Maximum Ratings	3
Electrical Characteristics	4
Diode Characteristics	4
Typical Performance Characteristics	5
Test Circuit & Waveform	7
Package Information	8
Notice	9

Maximum Ratings ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain to Source Voltage		V_{DS}	500	V
Gate to Source Voltage		V_{GS}	± 30	V
Drain Current _(Silicon limit)	$T_C=25^\circ\text{C}$	I_D	23	A
Pulsed Drain Current	$T_C=25^\circ\text{C}$ tp limited by T_{vjmax}	I_{DM}	92	A
Avalanche energy, single pulse	$L=10\text{mH}$, $R_g=25\Omega$	E_{AS}	1935	mJ
Power Dissipation	$T_C=25^\circ\text{C}$	P_D	277	W
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55 To +150	$^\circ\text{C}$
Lead Temperature for Soldering Purposes		T_L	270	

Thermal Characteristics

Parameter	Symbol	Max Value	Unit
Thermal Resistance, Junction-to-Case	R_{thJC}	0.45	$^\circ\text{C/W}$
Thermal Resistance, Junction-to-Ambient	R_{thJA}	40	

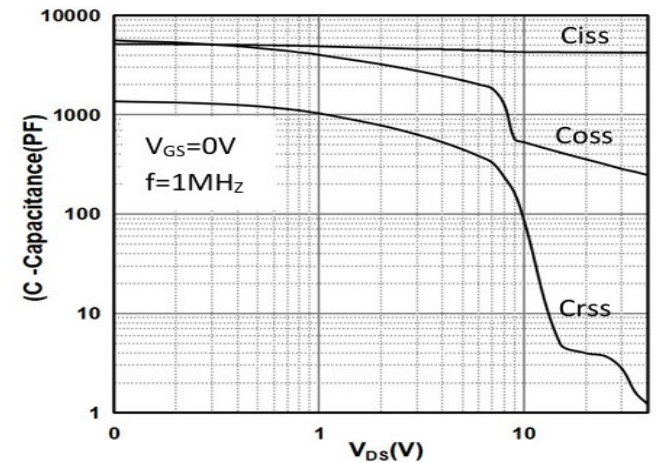
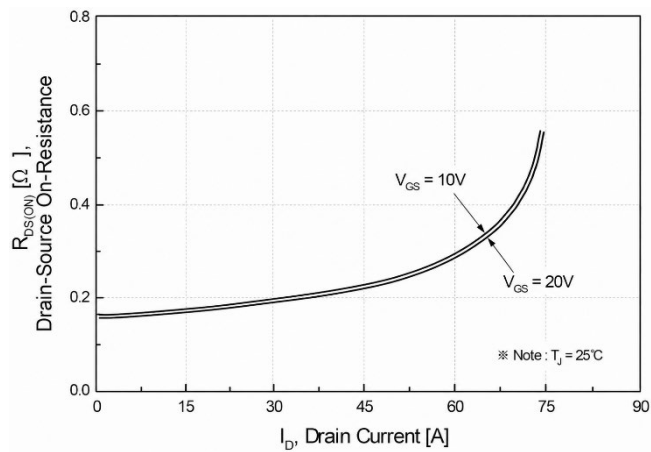
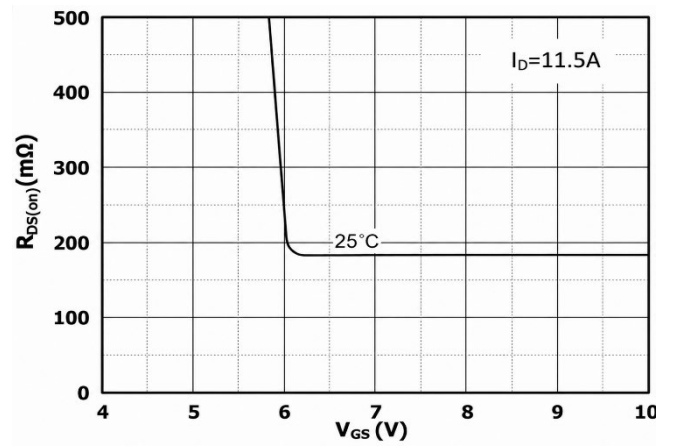
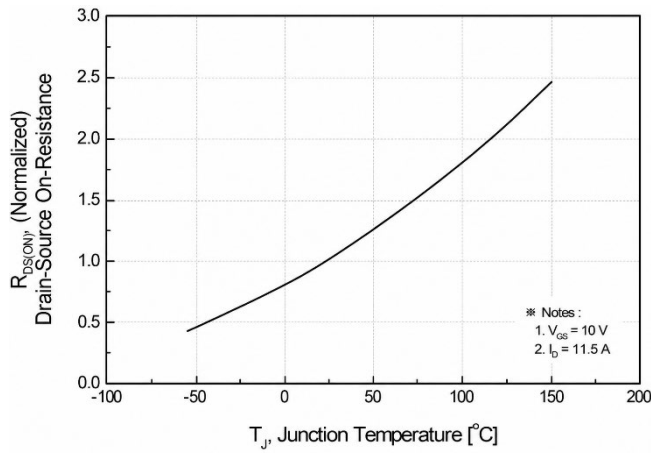
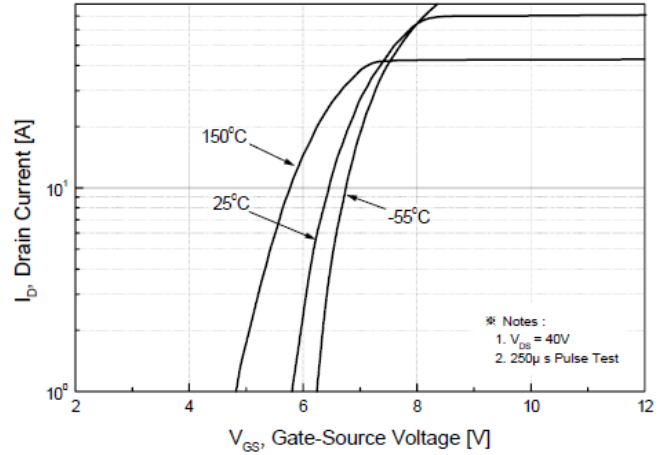
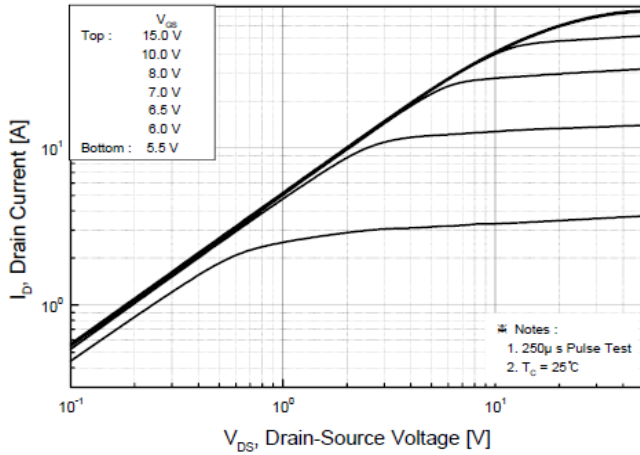
Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Drain-to-Source Breakdown Voltage	$B_{V_{DS}}$	$V_{GS}=0V, I_D=250\mu A$	500	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS}=0V$ $V_{DS}=V_{DSS}$ $T_J=25^\circ\text{C}$	-	-	1	μA
		$V_{GS}=0V$ $V_{DS}=80\%V_{DSS}$ $T_J=125^\circ\text{C}$	-	-	10	
Gate-to-Source leakage Current	I_{GSS}	$V_{GS}=\pm 30V, V_{DS}=0V$	-	-	± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$, $I_D=250\mu A$ $T_J=25^\circ\text{C}$	2.0	-	4.0	V
Drain-Source on-state resistance	$R_{DS(on)}$	$V_{GS}=10V$, $I_D=11.5A$ $T_J=25^\circ\text{C}$	-	189	227	m Ω
Gate resistance	R_g	$V_{GS}=0V, V_{DS}=0V, f=1\text{MHz}$	-	1.1	-	Ω
Transconductance	g_{fs}	$V_{DS}=40V, I_D=11.5A$	-	20	-	S
Input Capacitance	C_{iss}	$V_{DS} = 25\text{ V}, V_{GS} = 0\text{ V},$ $f = 1\text{ MHz}$	-	4260	-	pF
Output Capacitance	C_{oss}		-	317	-	
Reverse Transfer Capacitance	C_{rss}		-	2.4	-	
Total Gate Charge	Q_g	$V_{DS} = 400\text{ V}, V_{GS} = 0/10\text{ V},$ $I_D = 23\text{ A}$	-	80	-	nC
Gate- Source charge	Q_{gs}		-	24	-	
Gate-Drain charge	Q_{gd}		-	28	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DS} = 250\text{ V}$	-	90	-	ns
Turn-Off Delay Time	$t_{d(off)}$	$V_{GS} = 10\text{ V}$	-	95	-	
Rise time	t_r	$I_D = 23\text{ A}$ $R_G = 25\Omega$	-	365	-	
Fall time	t_f	$T_J = 25^\circ\text{C}$	-	85	-	

Diode Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Value			Unit
			min.	typ.	max.	
Diode Continuous Forward Current	I_S	$T_C=25^\circ\text{C}$	-	-	23	A
Pulsed Diode Forward Current	I_{SM}		-	-	92	
Diode Forward Voltage	V_{SD}	$I_S = 23A$ $T_J = 25^\circ\text{C}$	-	-	1.5	V
Reverse Recovery Time	t_{rr}	$V_R = 400\text{ V}, I_S = 23\text{ A},$	-	450	-	ns
Reverse Recovery Charge	Q_{rr}	$di/dt = 100\text{ A}/\mu\text{s}, T_J = 25^\circ\text{C}$	-	5.4	-	μC

Typical Performance Characteristics



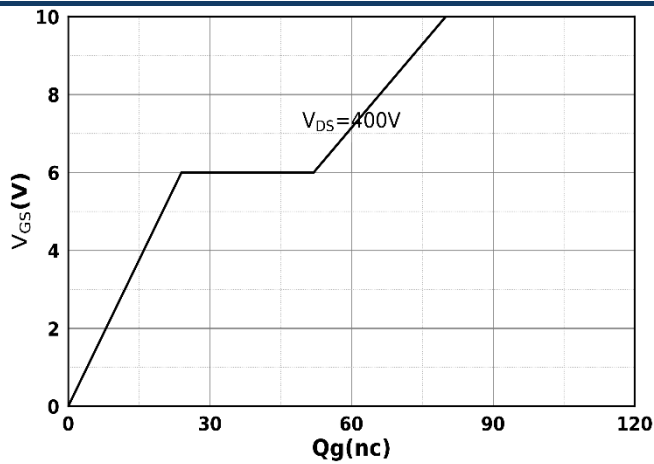


Fig 7. Gate Charge Characteristics

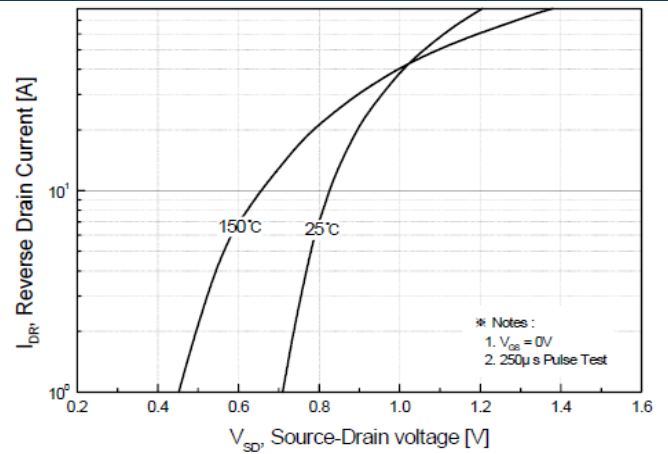


Fig 8. Body-diode Forward Characteristics

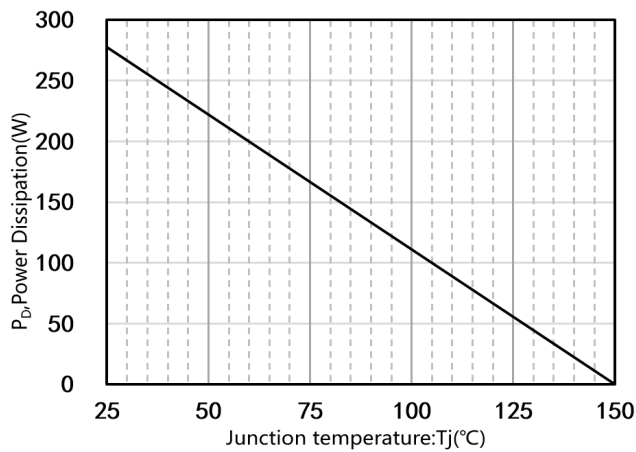


Fig 9. Power Dissipation

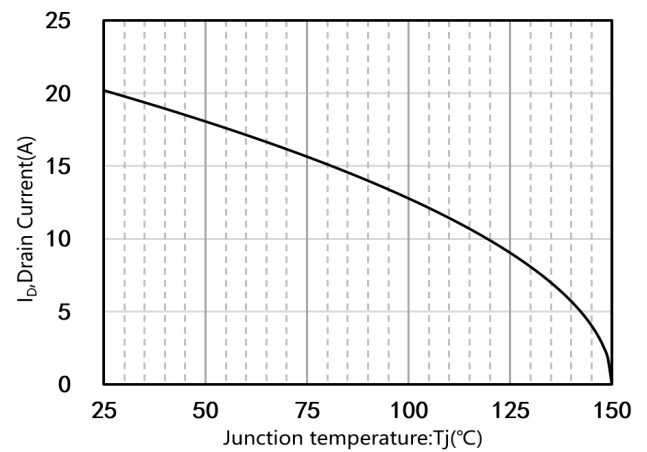


Fig 10. Drain Current Derating

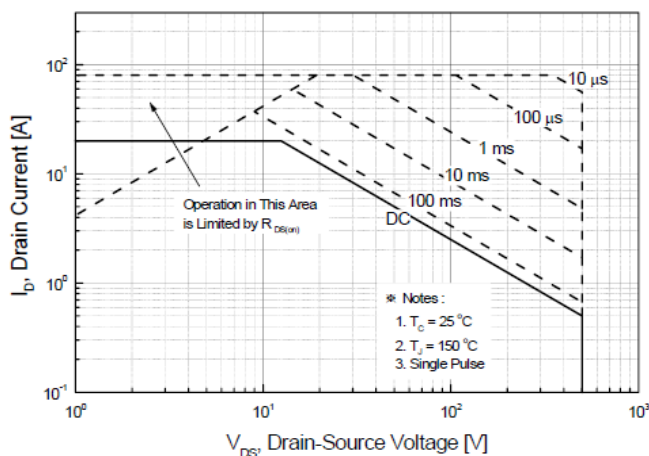


Fig 11. Safe Operating Area

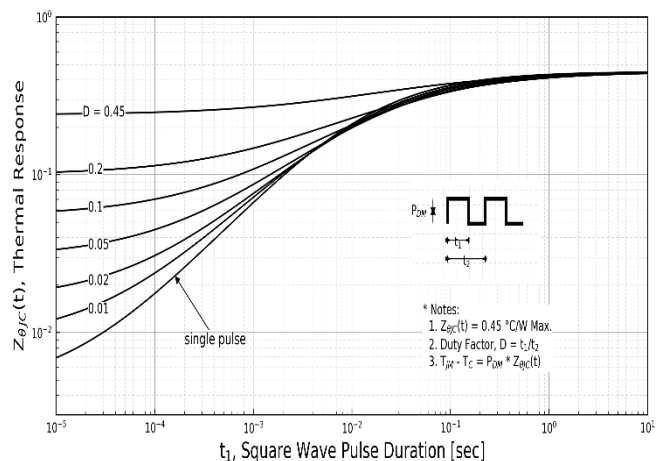
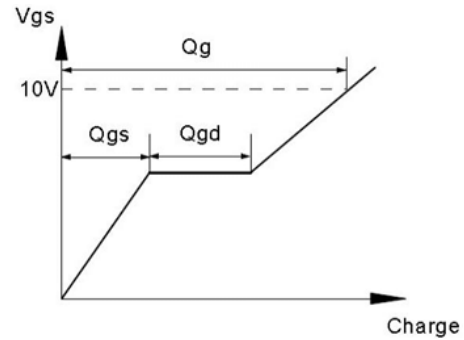
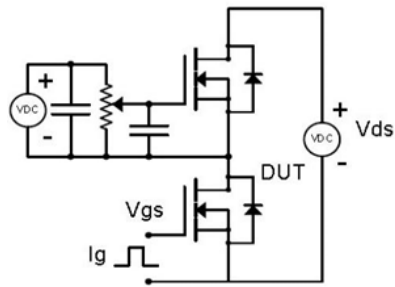
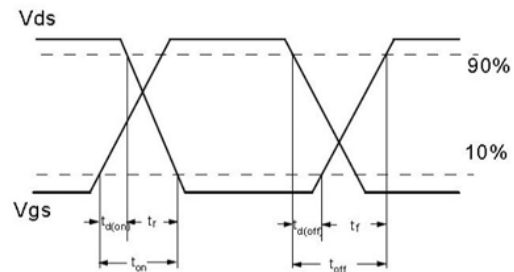
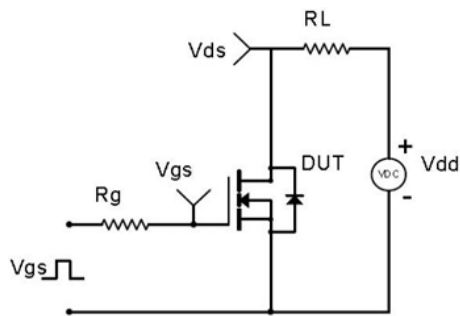


Fig 12. Transient Thermal Response Curve

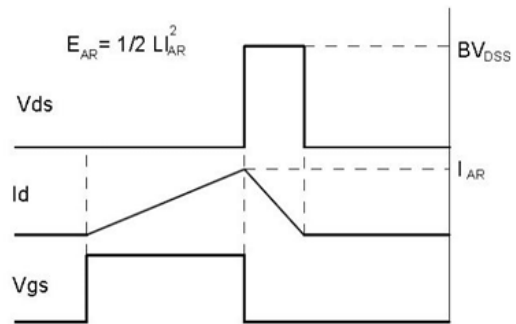
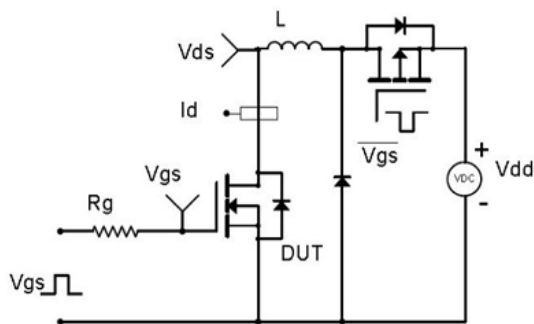
Test Circuit & Waveform



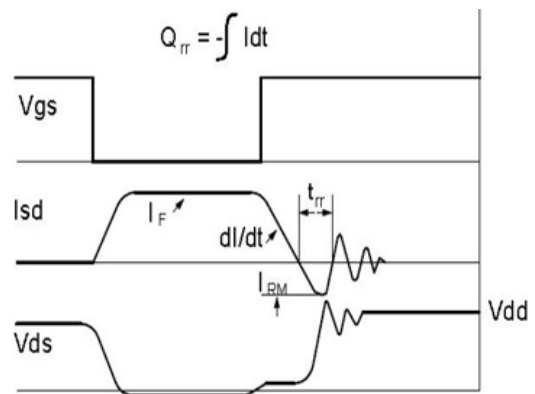
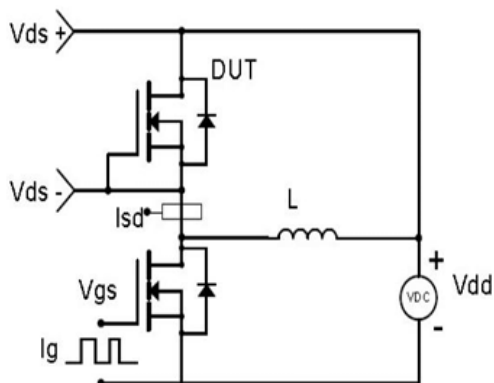
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveforms

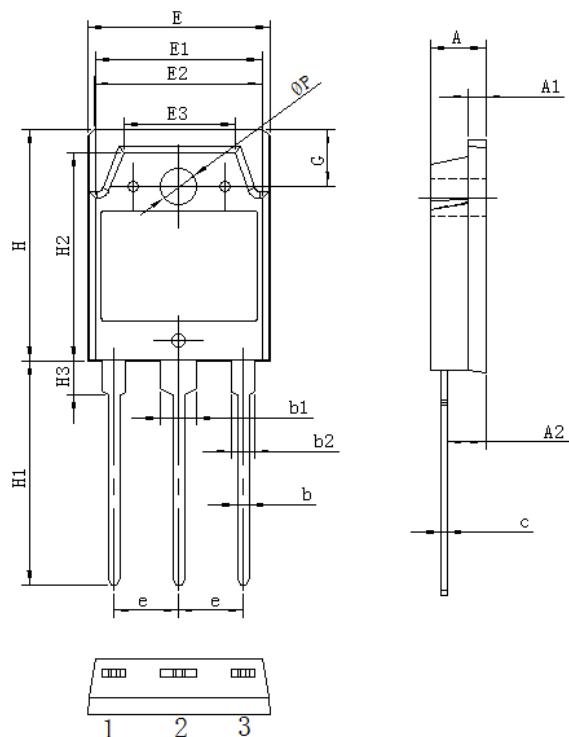


Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms

Package Information



Symbol	单位 mm		
	Min	Nom	Max
A	4.60	4.80	5.00
A1	1.3	1.5	1.7
A2	2.20	2.40	2.60
b	0.80	1.0	1.20
b1	2.90	3.10	3.30
b2	1.90	2.10	2.30
c	0.50	0.60	0.70
e	5.25	5.45	5.65
E	15.2	15.6	16.0
E1	13.2	13.4	13.6
E2	13.1	13.3	13.5
E3	9.1	9.3	9.5
H	19.8	20.0	20.2
H1	19.4	19.8	20.2
H2	18.5	18.7	18.9
H3	2.9	3.1	3.3
G	4.8	5.0	5.2
ΦP	3.00	3.20	3.40

Notice

Thunder Microelectronics Incorporated Limited reserves the right to make changes without further notice to any products or specifications herein. When use the product, be sure to obtain the latest specification.

Thunder Microelectronics Incorporated Limited does not assume any liability arising out of the application or any product described herein. When using Thunder Microelectronics Incorporated Limited products in your equipment, you are requested to take adequate safety measures to prevent the equipment from causing a physical injury ,fire or other problem if any of the products become faulty.

-Headquarters

WuXi Thunder Microelectronics Incorporated Limited

Building E1-9, No.200 LingHu Road, XinWu district,WuXi,China 214135

Tel:+86-510-85160109 Fax:+86-510-85160109