
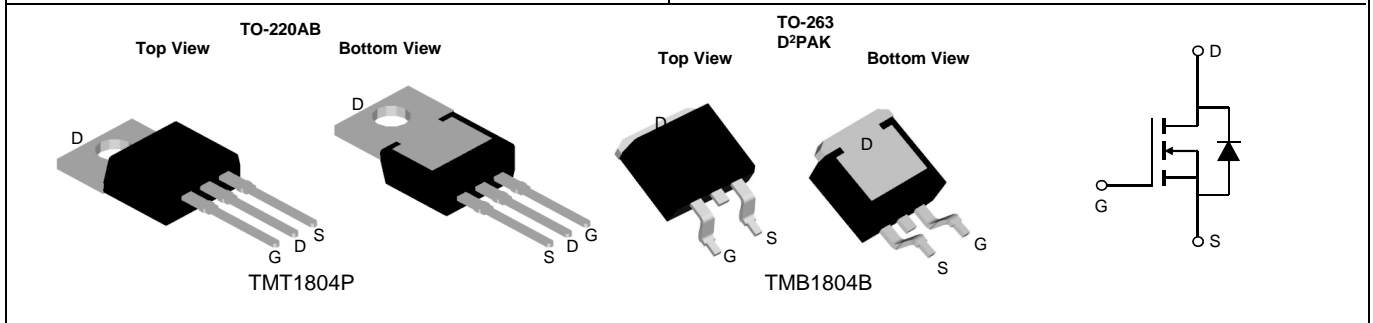




## TMT1804P / TMB1804B N-CHANNEL POWER MOSFET

<p><b>General Description</b></p> <p>The 1804 uses advanced trench technology and design to provide excellent <math>R_{DS(ON)}</math> with low gate charge. It can be used in a wide variety of applications.</p>	<p><b>Product Summary</b></p> <ul style="list-style-type: none"> <li>40V/110A</li> <li><math>R_{DS(ON)} = 3.6m\Omega(\text{typ.}) @ V_{GS} = 10V</math></li> <li><math>R_{DS(ON)} = 4.4m\Omega(\text{typ.}) @ V_{GS} = 4.5V</math></li> <li>Reliable and Rugged</li> <li>Lead Free and Green Devices Available (RoHS Compliant)</li> </ul> <p>100% UIS Tested                  100% <math>R_g</math> Tested</p> 
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### Absolute Maximum Ratings

Symbol	Parameter	Rating	Unit
<b>Common Ratings</b> ( $T_c=25^\circ\text{C}$ Unless Otherwise Noted)			
$V_{DSS}$	Drain-Source Voltage	40	V
$V_{GSS}$	Gate-Source Voltage	$\pm 20$	V
$T_J$	Maximum Junction Temperature	175	$^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 175	$^\circ\text{C}$
$I_S$	Source Current-Continuous(Body Diode)	$T_c=25^\circ\text{C}$ 110	A

### Mounted on Large Heat Sink

$I_{DM}$	Pulsed Drain Current *	$T_c=25^\circ\text{C}$	440	A
$I_D$	Continuous Drain Current	$T_c=25^\circ\text{C}$	110	A
		$T_c=100^\circ\text{C}$	77	A
$P_D$	Maximum Power Dissipation	$T_c=25^\circ\text{C}$	125	W
		$T_c=100^\circ\text{C}$	62.5	W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case**		1.2	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		62.5	$^\circ\text{C/W}$
$E_{AS}$	Single Pulsed-Avalanche Energy ***	$L=0.3\text{mH}$	365	mJ

Note: \* Repetitive rating; pulse width limited by max.junction temperature.  
 \*\* Drain current is limited by junction temperature.  
 \*\*\* Limited by  $T_{Jmax}$ , starting  $T_J=25^\circ\text{C}$ ,  $L = 0.3\text{mH}$ ,  $R_g = 25\Omega$ ,  $V_{GS} = 10V$ .

## Electrical Characteristics (T<sub>c</sub> =25°C Unless Otherwise Noted)

Symbol	Parameter	Test Conditions	1804			Unit
			Min	Typ.	Max	
<b>Static Characteristics</b>						
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>DS</sub> =250μA	40	-	-	V
I <sub>DSS</sub>	Drain-to-Source Leakage Current	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V	-	-	1	μA
		T <sub>J</sub> =55°C	-	-	5	μA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1	1.8	3	V
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	-	-	±100	nA
R <sub>DS(ON)*</sub>	Drain-Source On-State Resistance	V <sub>GS</sub> =10V, I <sub>DS</sub> =55A	-	3.6	4.5	mΩ
		V <sub>GS</sub> =4.5V, I <sub>DS</sub> =55A	-	4.4	5.5	
<b>Diode Characteristics</b>						
V <sub>SD*</sub>	Diode Forward Voltage	I <sub>SD</sub> =55A, V <sub>GS</sub> =0V	-	0.8	1.2	V
t <sub>rr</sub>	Reverse Recovery Time	I <sub>SD</sub> =55A, dI <sub>SD</sub> /dt=100A/μs	-	53	-	ns
Q <sub>rr</sub>	Reverse Recovery Charge		-	78	-	nC
<b>Dynamic Characteristics</b>						
R <sub>G</sub>	Gate Resistance	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, Frequency=1.0MHz	-	2.9	-	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>GS</sub> =0V, V <sub>DS</sub> =25V, Frequency=1.0MHz	-	4175.6	-	pF
C <sub>oss</sub>	Output Capacitance		-	406.3	-	
C <sub>rss</sub>	Reverse Transfer Capacitance		-	239.8	-	
t <sub>d(ON)</sub>	Turn-on Delay Time		V <sub>DD</sub> =20V, R <sub>G</sub> =4Ω, I <sub>DS</sub> =55A, V <sub>GS</sub> =10V	-	20	-
T <sub>r</sub>	Turn-on Rise Time	-		23	-	
t <sub>d(OFF)</sub>	Turn-off Delay Time	-		26	-	
T <sub>f</sub>	Turn-off Fall Time	-		30	-	
<b>Gate Charge Characteristics</b>						
Q <sub>g</sub>	Total Gate Charge	V <sub>DS</sub> =32V, V <sub>GS</sub> =10V, I <sub>D</sub> =55A	-	86.2	-	nC
Q <sub>gs</sub>	Gate-Source Charge		-	9.8	-	
Q <sub>gd</sub>	Gate-Drain Charge		-	20.1	-	

Note: \*Pulse test, pulse width ≤ 300us, duty cycle ≤ 2%

# Typical Operating Characteristics

Figure 1: Power Dissipation

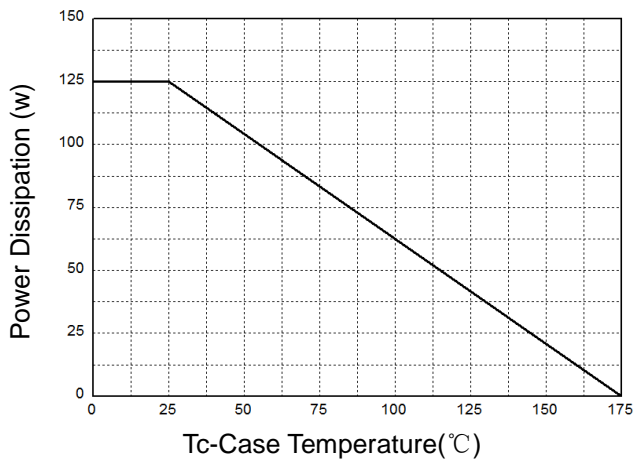


Figure 2: Drain Current

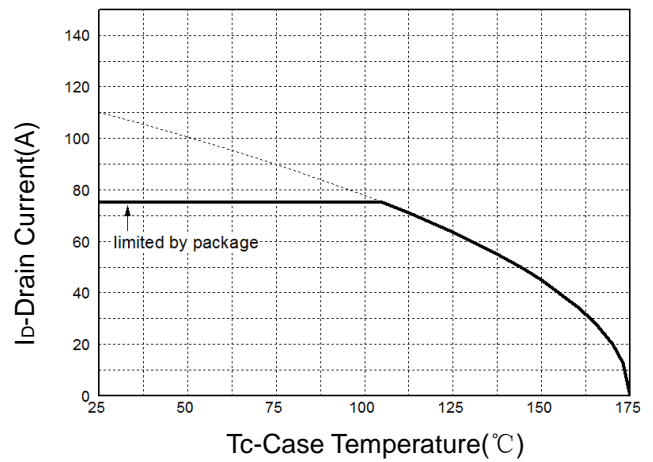


Figure 3: Safe Operation Area

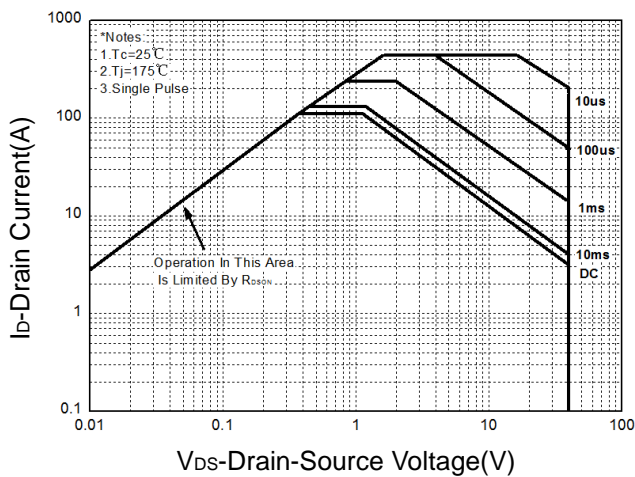


Figure 4: Thermal Transient Impedance

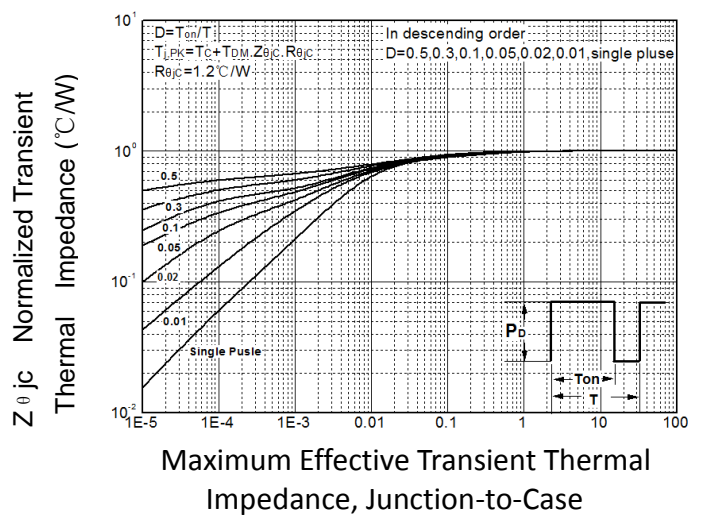


Figure 5: Output Characteristics

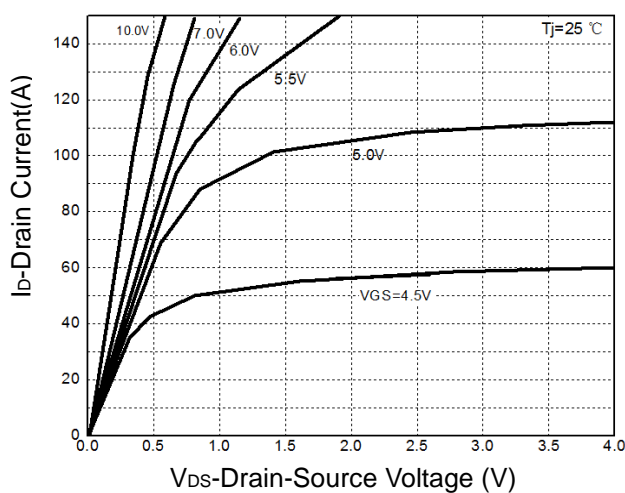
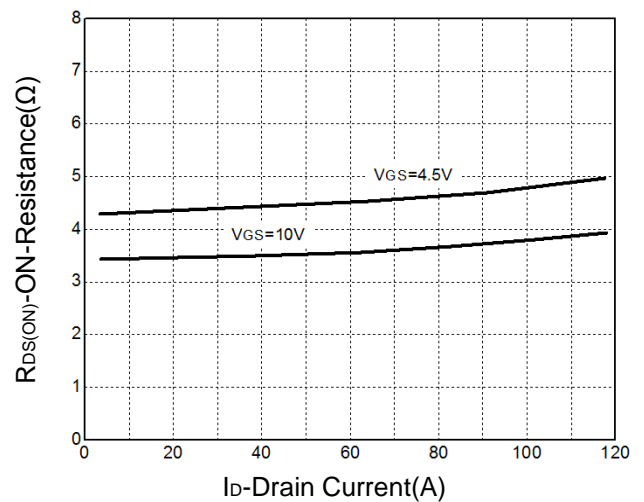


Figure 6: Drain-Source On Resistance



## Typical Operating Characteristics(Cont.)

Figure 7: On-Resistance vs. Temperature

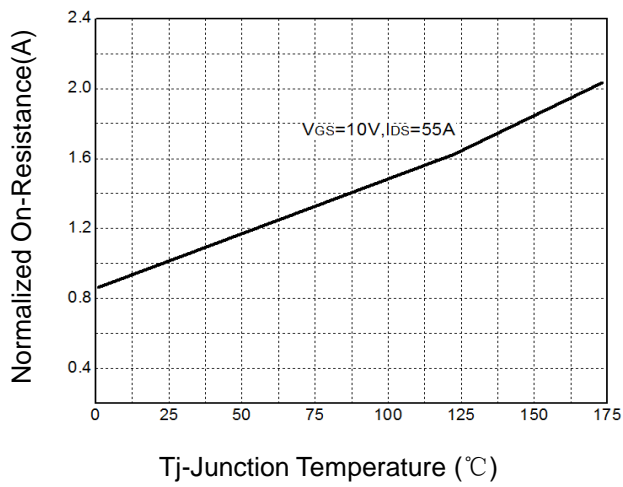


Figure 8: Source-Drain Diode Forward

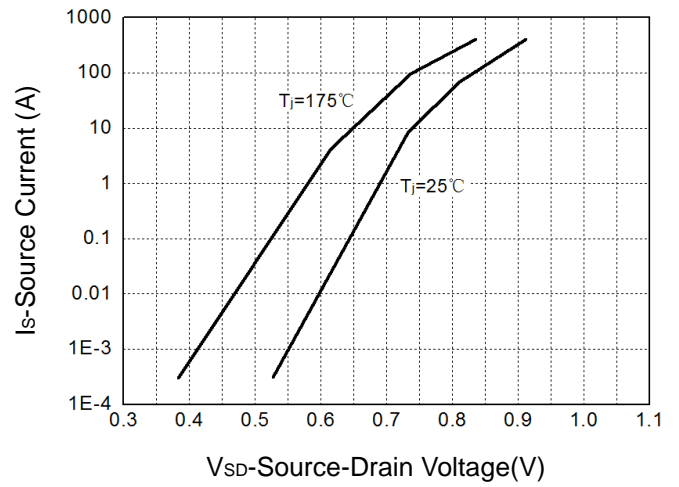


Figure 9: Capacitance Characteristics

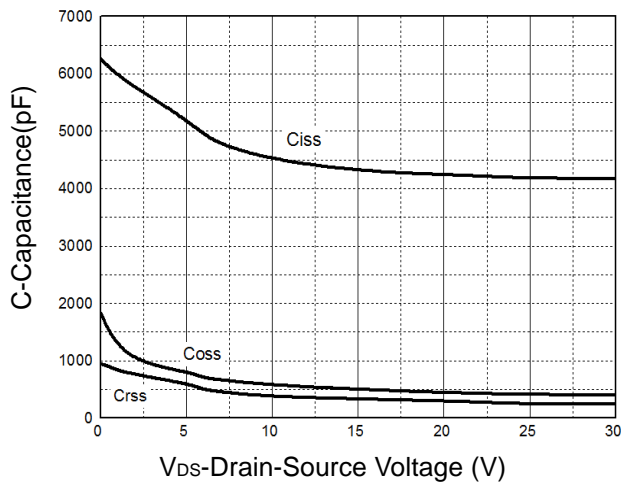
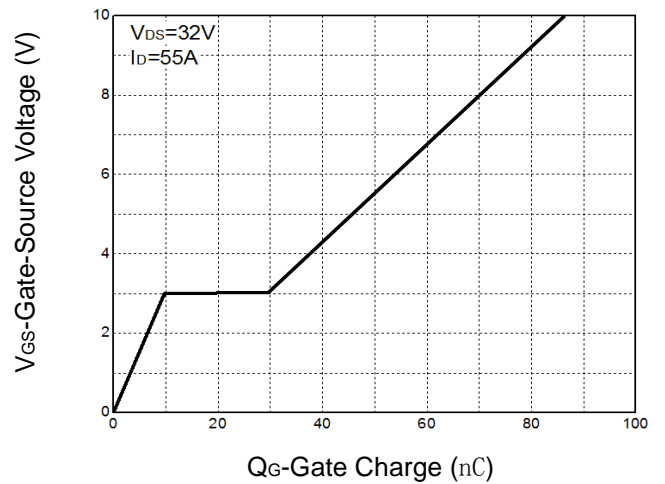
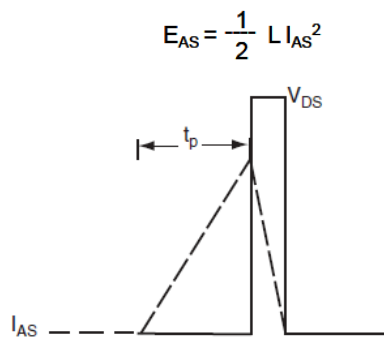
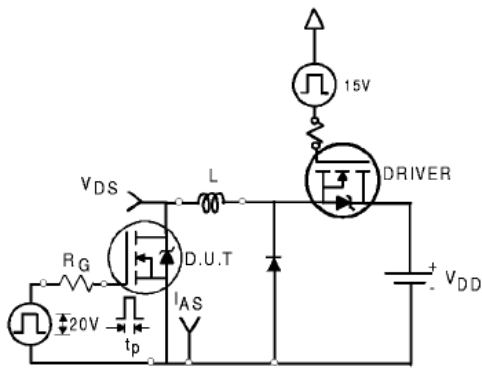


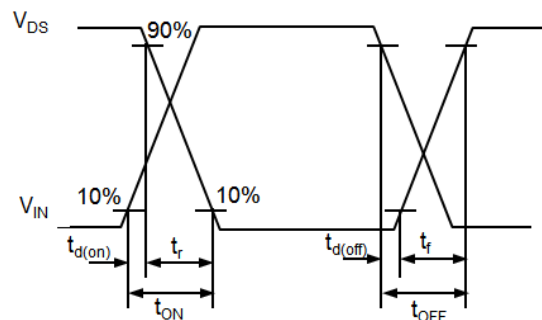
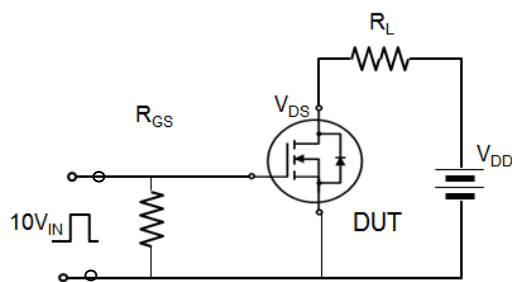
Figure 10: Gate Charge Characteristics



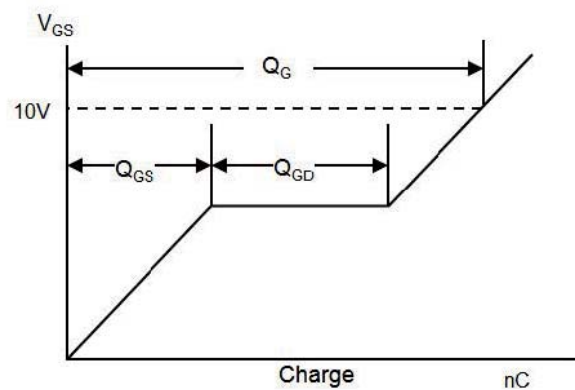
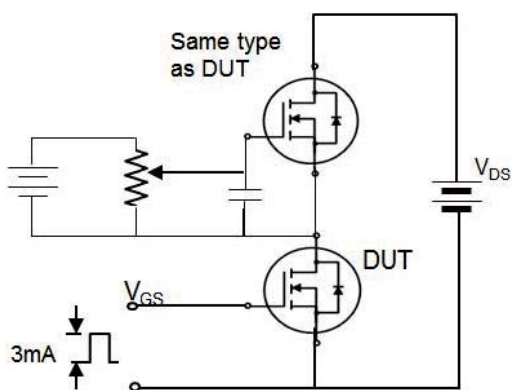
## Avalanche Test Circuit



## Switching Time Test Circuit

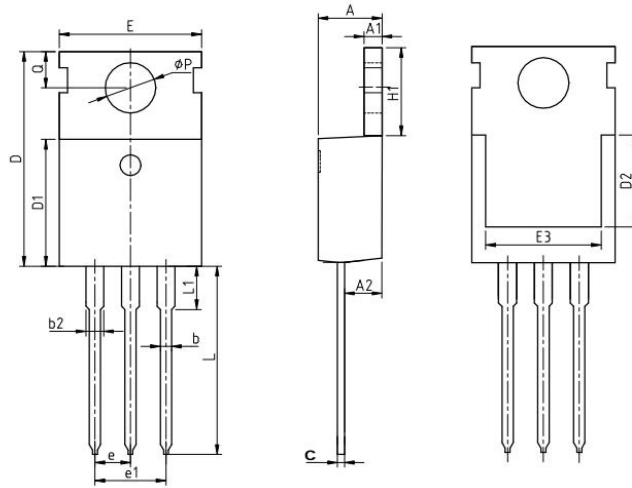


## Gate Charge Test Circuit



# Package Information

## TO-220AB

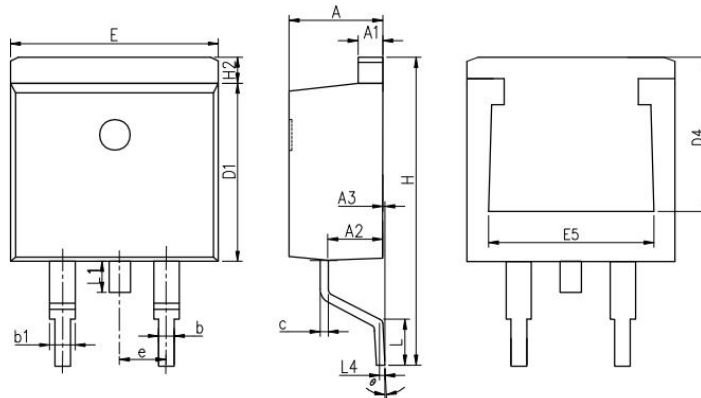


### COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.25	1.30	1.45
A2	2.20	2.40	2.60
b	0.70	0.80	0.95
b2	1.17	1.27	1.47
c	0.40	0.50	0.65
D	15.10	15.60	16.10
D1	8.80	9.10	9.40
D2	5.50	-	-
E	9.70	10.00	10.30
E3	7.00	-	-
e	2.54 BSC		
e1	5.08 BSC		
H1	6.25	6.50	6.85
L	12.75	13.50	13.80
L1	-	3.10	3.40
$\Phi P$	3.40	3.60	3.80
Q	2.60	2.80	3.00

# Package Information

## TO-263



### COMMON DIMENSIONS

SYMBOL	mm		
	MIN	NOM	MAX
A	4.37	4.57	4.77
A1	1.22	1.27	1.42
A2	2.49	2.69	2.89
A3	0	0.13	0.25
b	0.7	0.81	0.96
b1	1.17	1.27	1.47
c	0.3	0.38	0.53
D1	8.5	8.7	8.9
D4	6.6	-	-
E	9.86	10.16	10.36
E5	7.06	-	-
e	2.54 BSC		
H	14.7	15.1	15.5
H2	1.07	1.27	1.47
L	2	2.3	2.6
L1	1.4	1.55	1.7
L4	0.25 BSC		
θ	0°	5°	9°