

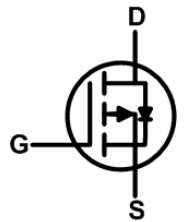
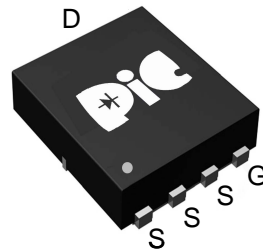
## ➤ General Description

This PAP61TV15V P-Channel enhancement mode power field effect transistor is the high density trench technology and this advanced technology can provide excellent  $R_{ds(On)}$  performance and efficiency for power switching and load switching application., this device also comply with the RoHS and Green Product requirement with full function reliability approved.

## ➤ Feature

- Super Low Gate Charge
- 100% EAS Guaranteed
- Green Device Available
- Excellent  $CdV/dt$  effect decline
- Advanced high cell density Trench technology

## ➤ DFN3X3A-EP1



## ➤ Application

- DC/DC Primary Side Switch
- Industrial Synchronous
- Rectification Load Switch
- DC/DC Converters

## ➤ Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	$V_{DS}$	-60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current, $-V_{GS}$ @ $-10V^1$	$I_D@T_C=25^\circ C$	-26	A
Continuous Drain Current, $-V_{GS}$ @ $-10V^1$	$I_D@T_C=100^\circ C$	-16	A
Pulsed Drain Current <sup>2</sup>	$I_{DM}$	-70	A
Single Pulse Avalanche Energy <sup>3</sup>	EAS	113	mJ
Avalanche Current	$I_{AS}$	47.6	A
Total Power Dissipation <sup>4</sup>	$P_D@T_C=25^\circ C$	31.25	W
Storage Temperature Range	$T_{STG}$	-55 to 150	$^\circ C$
Operating Junction Temperature Range	$T_J$	-55 to 150	$^\circ C$
Thermal Resistance Junction-Ambient <sup>1</sup>	$R_{\theta JA}$	62	$^\circ C/W$
Thermal Resistance Junction-Case <sup>1</sup>	$R_{\theta JC}$	4	$^\circ C/W$

### ➤ Electrical Characteristics ( $T_J=25^\circ C$ Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V$ , $I_D=-250\mu A$	-60	---	---	V
Static Drain-Source On-Resistance <sup>2</sup>	$R_{DS(ON)}$	$V_{GS}=-10V$ , $I_D=-12A$	---	20	25	m $\Omega$
		$V_{GS}=-4.5V$ , $I_D=-10A$	---	25	33	
Gate Threshold Voltage	$V_{GS(th)}$	$V_{GS}=V_{DS}$ , $I_D=-250\mu A$	-1.0	-1.5	-2.5	V
Drain-Source Leakage Current	$I_{DSS}$	$V_{DS}=-48V$ , $V_{GS}=0V$ , $T_J=25^\circ C$	---	---	1	uA
		$V_{DS}=-48V$ , $V_{GS}=0V$ , $T_J=55^\circ C$	---	---	5	
Gate-Source Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V$ , $V_{DS}=0V$	---	---	$\pm 100$	nA
Forward Transconductance	$g_{fs}$	$V_{DS}=-10V$ , $I_D=-12A$	---	23	---	S
Gate Resistance	$R_g$	$V_{DS}=0V$ , $V_{GS}=0V$ , $f=1MHz$	---	7	---	$\Omega$
Total Gate Charge (-4.5V)	$Q_g$	$V_{DS}=-20V$ , $V_{GS}=-4.5V$ , $I_D=-12A$	---	25	---	nC
Gate-Source Charge	$Q_{gs}$		---	6.7	---	
Gate-Drain Charge	$Q_{gd}$		---	5.5	---	
Turn-On Delay Time	$T_{d(on)}$	$V_{DD}=-15V$ , $V_{GS}=-10V$ , $R_G=3.3\Omega$ , $I_D=-1A$	---	38	---	ns
Rise Time	$T_r$		---	23.6	---	
Turn-Off Delay Time	$T_{d(off)}$		---	100	---	
Fall Time	$T_f$		---	6.8	---	
Input Capacitance	$C_{iss}$	$V_{DS}=-15V$ , $V_{GS}=0V$ , $f=1MHz$	---	3635	---	pF
Output Capacitance	$C_{oss}$		---	224	---	
Reverse Transfer Capacitance	$C_{rss}$		---	141	---	

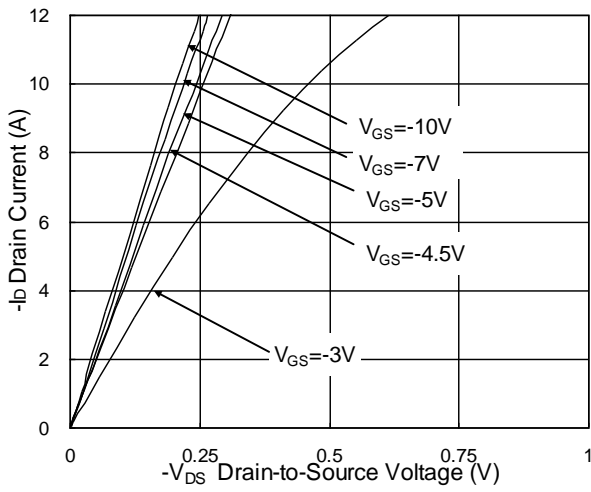
### ➤ Diode Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current <sup>1,5</sup>	$I_S$	$V_G=V_D=0V$ , Force Current	---	---	-26	A
Diode Forward Voltage <sup>2</sup>	$V_{SD}$	$V_{GS}=0V$ , $I_S=-1A$ , $T_J=25^\circ C$	---	---	-1	V

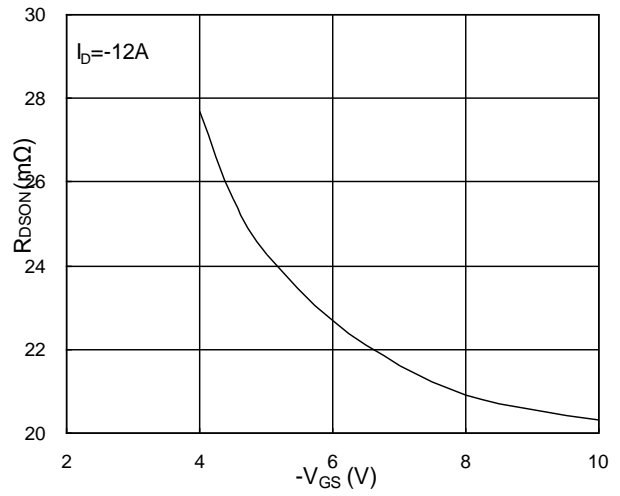
Note :

1. Pulse width limited by maximum junction temperature.
2. The data tested by pulsed, pulse width  $\leq 300\mu s$ , duty cycle  $\leq 2\%$
3. The EAS data shows Max. rating. The test condition is  $V_{DD}=-25V$ ,  $V_{GS}=-10V$ ,  $L=0.1mH$ ,  $I_{AS}=-47.6A$
4. Ensure that the channel temperature does not exceed  $150^\circ C$ .
5. The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.

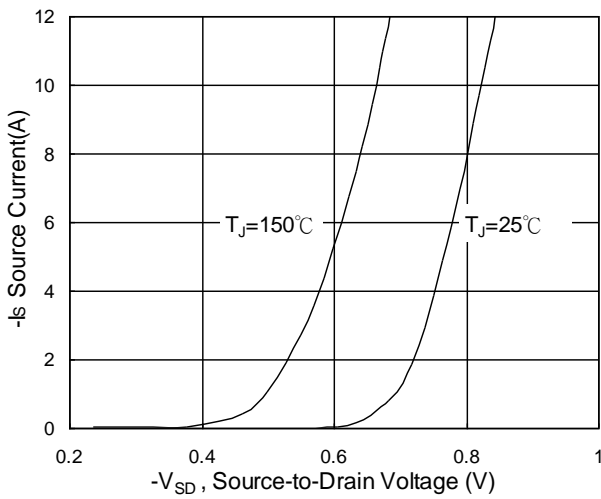
## ➤ Typical Characteristics



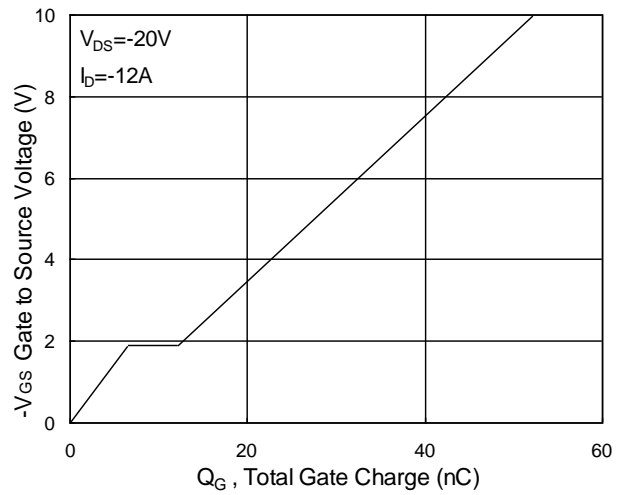
**Fig.1 Typical Output Characteristics**



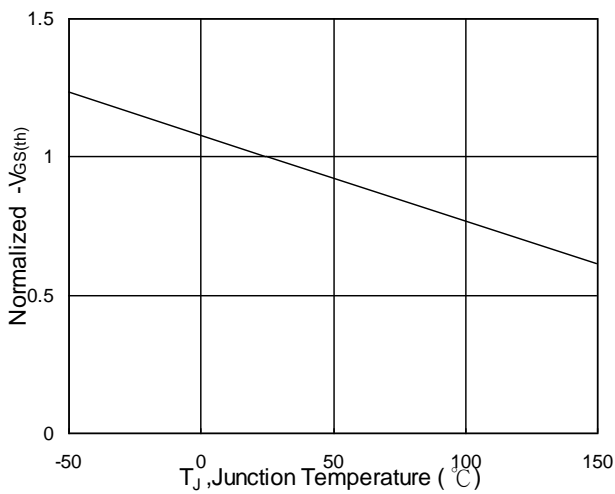
**Fig.2 On-Resistance vs G-S Voltage**



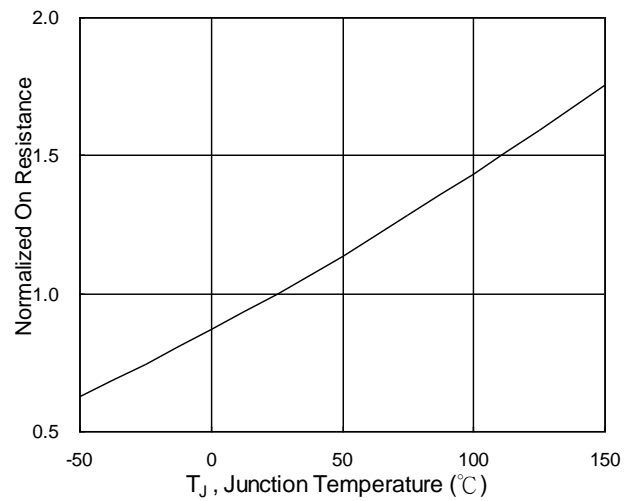
**Fig.3 Source Drain Forward Characteristics**



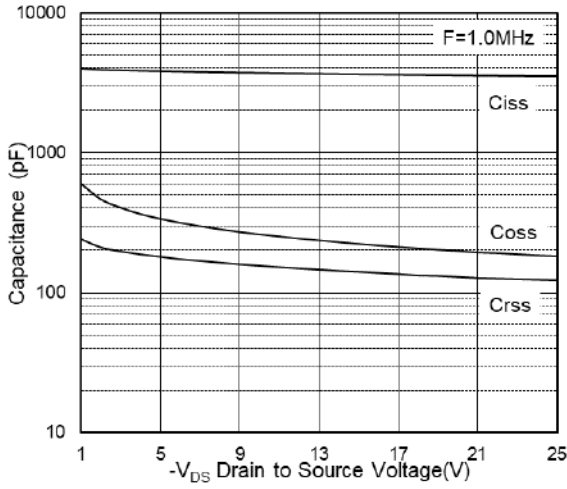
**Fig.4 Gate-Charge Characteristics**



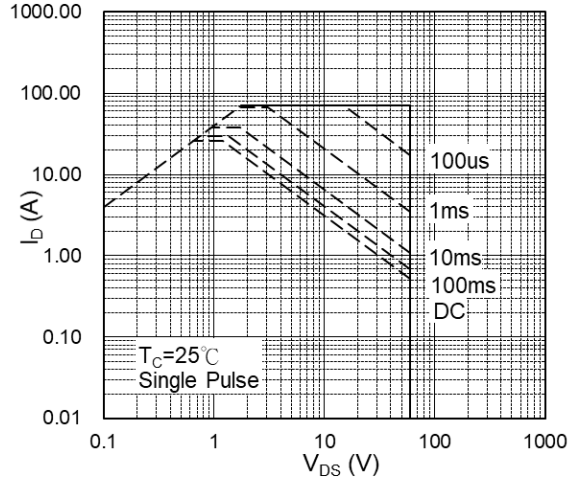
**Fig.5 Normalized  $V_{GS(th)}$  vs  $T_J$**



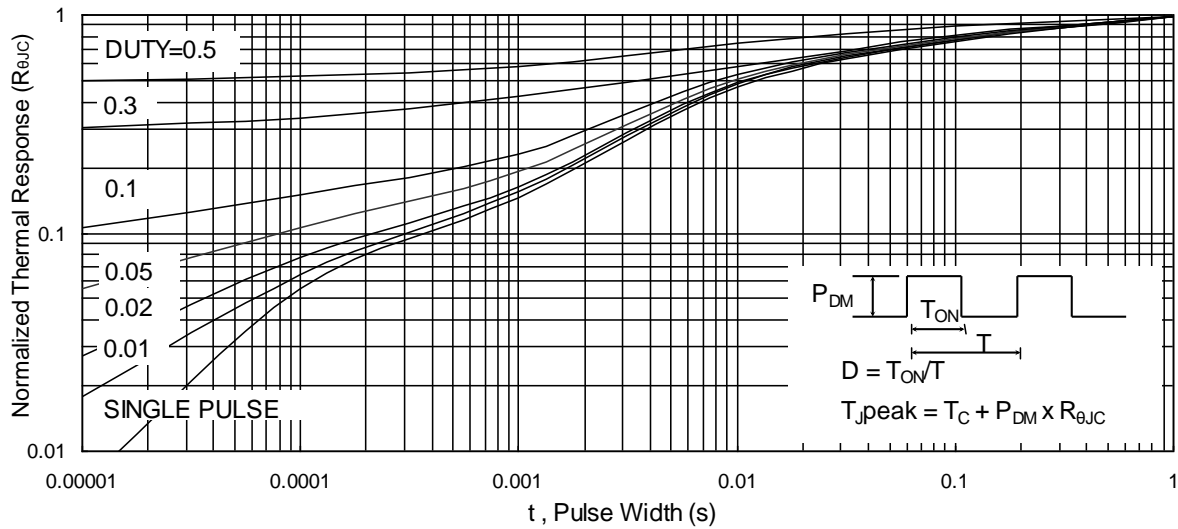
**Fig.6 Normalized  $R_{DS(ON)}$  vs  $T_J$**



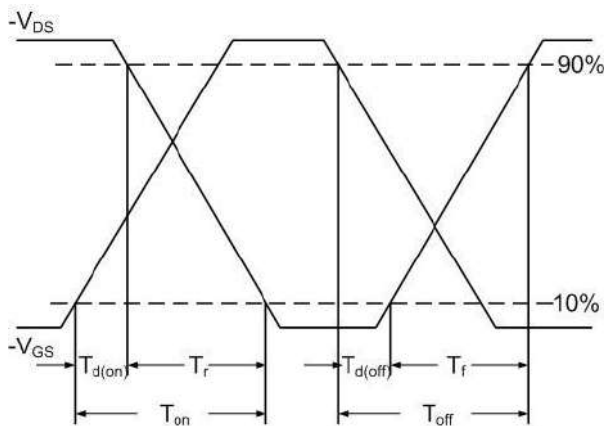
**Fig.7 Capacitance**



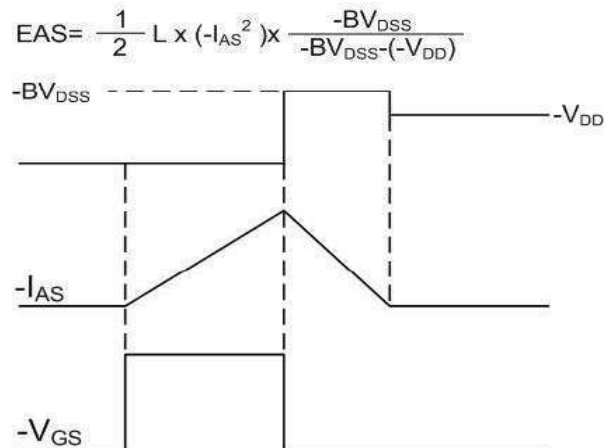
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**

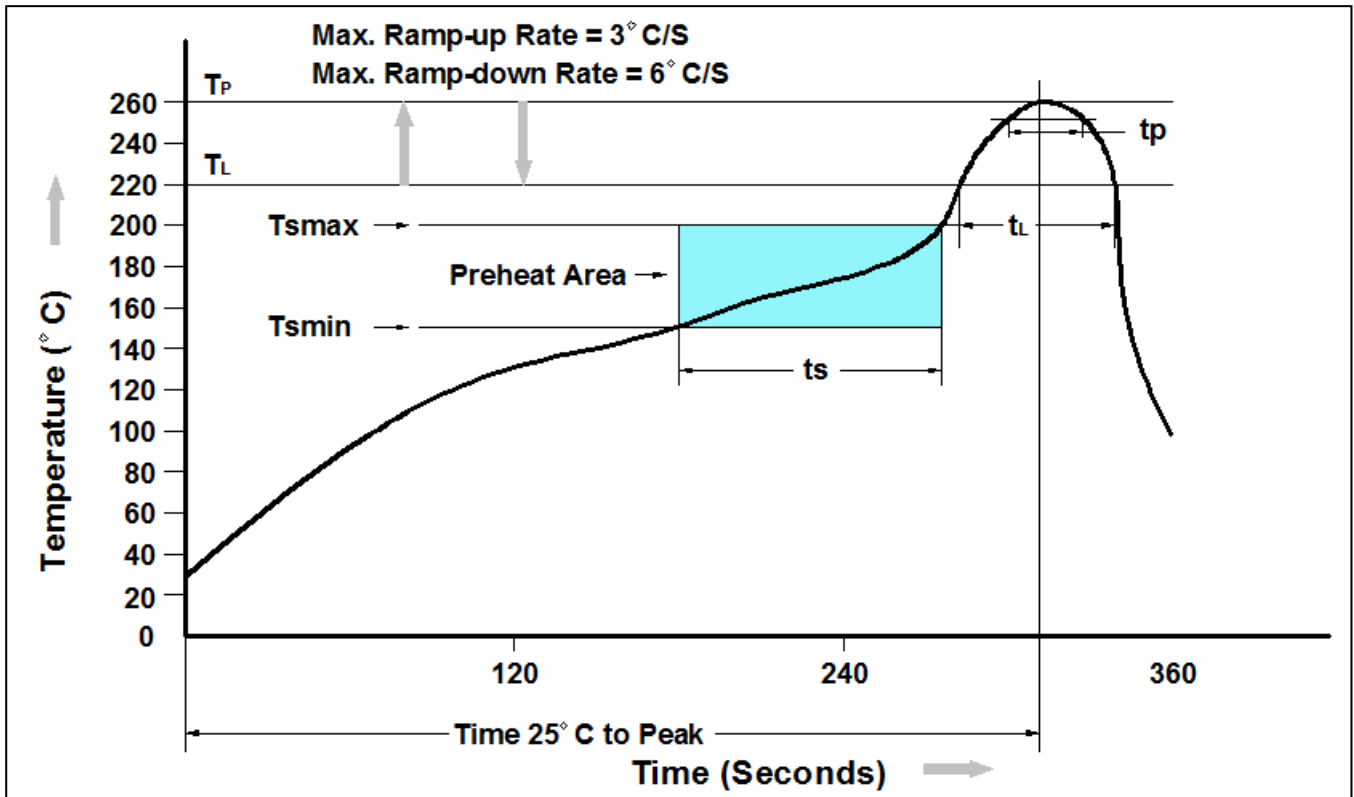


**Fig.10 Switching Time Waveform**



**Fig.11 Unclamped Inductive Waveform**

## ➤ Recommend IR Reflow Soldering Thermal Profile

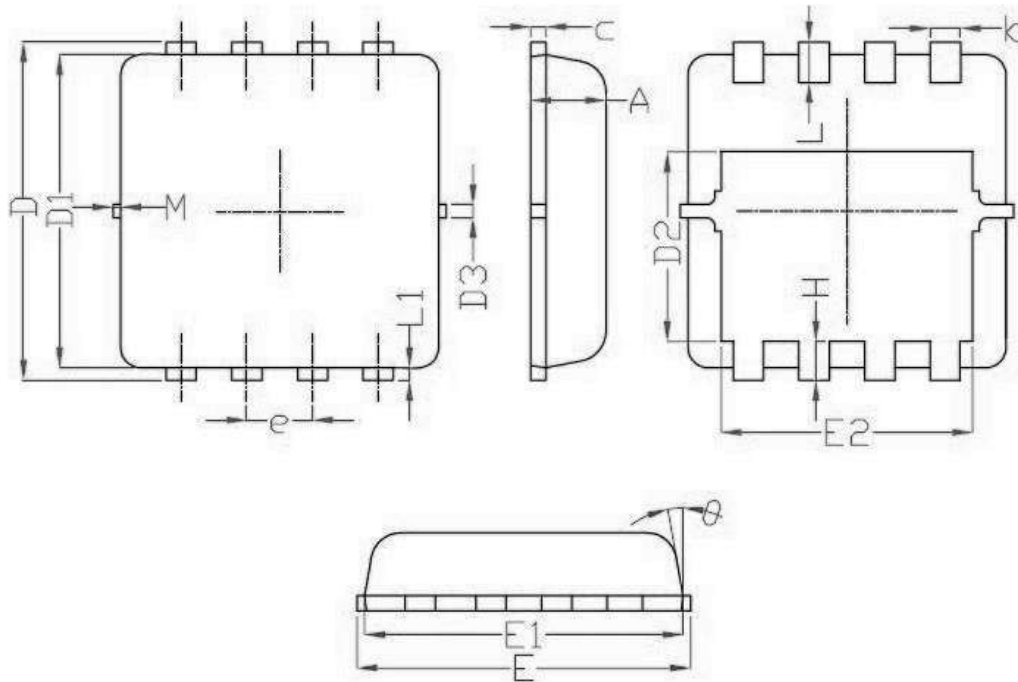


Profile Feature	Pb-Free Assembly Profile
Temperature Min. (T <sub>smin</sub> )	150°C
Temperature Max. (T <sub>smax</sub> )	200°C
Time (t <sub>s</sub> ) from (T <sub>smin</sub> to T <sub>smax</sub> )	60-120 seconds
Average Ramp-up Rate (t <sub>L</sub> to t <sub>P</sub> )	3°C/second max.
Liquidous Temperature (T <sub>L</sub> )	217°C
Time (t <sub>L</sub> ) Maintained Above (T <sub>L</sub> )	60 – 150 seconds
Peak Temperature	260°C +0°C / -5°C
Time (t <sub>P</sub> ) within 5°C of actual Peak Temperature	30 seconds
Ramp-down Rate (T <sub>P</sub> to T <sub>L</sub> )	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

## ➤ Ordering Information

Part Number	Description	Quantity
PAP61TV15V	DFN3X3A-EP1 Reel	3000 pcs

➤ Package Information (DFN3X3A-EP1)



SYMBOLS	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.70	0.85	0.027	0.034
b	0.20	0.40	0.007	0.016
c	0.10	0.25	0.004	0.010
D	3.15	3.45	0.124	0.136
D1	2.90	3.20	0.114	0.126
D2	1.54	1.98	0.060	0.080
D3	0.10	0.30	0.004	0.012
E	3.15	3.45	0.124	0.136
E1	3.00	3.25	0.118	0.128
E2	2.29	2.65	0.090	0.104
e	0.65 BSC		0.025 BSC	
H	0.28	0.65	0.011	0.026
Θ	0°	14°	0°	14°
L	0.30	0.50	0.012	0.020
L1	0.13		0.005	
M	---	0.15	---	0.006

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