N-Ch 30V Fast Switching MOSFET

V_{DS}=30V, I_D=3.9A, RDS(ON)=40mΩ

➢ General Description

This PAN3514N N-Channel enhancement mode power field effect transistor is the high density trench technology and this advanced technology can provide excellent Rds(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

●Green Device Available

●Excellent CdV/dt effect decline

●Advanced high cell density Trench technology

●SOT-23 Package design

➢ SOT-23
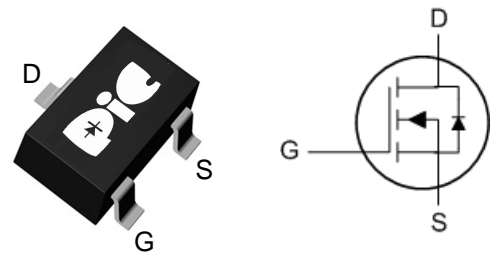
➢ Application

●Load Switch

●Portable instrument

●MB / NB / 3C device

➢ Absolute Maximum Ratings

Parameter	Symbol	Rating	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current, V_{GS} @ 4.5V[1]	I_D@T_A=25℃	3.9	A
Continuous Drain Current, V_{GS} @ 4.5V[1]	I_D@T_A=70℃	3.1	A
Pulsed Drain Current[2]	I_{DM}	16	A
Total Power Dissipation[3]	P_D@T_A=25℃	1	W
Storage Temperature Range	T_{STG}	-55 to 150	℃
Operating Junction Temperature Range	T_J	-55 to 150	℃
Thermal Resistance Junction-ambient [1]	$R_{θJA}$	125	℃/W
Thermal Resistance Junction-Case[1]	$R_{θJC}$	80	℃/W

➢ Electrical Characteristics (T$_J$=25°C Unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	BV$_{DSS}$	V$_{GS}$=0V , I$_D$=250uA	30	---	---	V
BVDSS Temperature Coefficient	△ BV$_{DSS}$/△ T$_J$	Reference to 25°C , I$_D$=1mA	---	0.029	---	V/°C
Static Drain-Source On-Resistance2	R$_{DS(ON)}$	V$_{GS}$=4.5V , I$_D$=3A	---	32	40	mΩ
		V$_{GS}$=2.5V , I$_D$=2A	---	38	47	
Gate Threshold Voltage	V$_{GS(th)}$	V$_{GS}$=V$_{DS}$, I$_D$ =250uA	0.5	0.7	1.2	V
V$_{GS(th)}$ Temperature Coefficient	△ V$_{GS(th)}$		---	-2.82	---	mV/°C
Drain-Source Leakage Current	I$_{DSS}$	V$_{DS}$=24V , V$_{GS}$=0V , T$_J$=25°C	---	---	1	uA
		V$_{DS}$=24V , V$_{GS}$=0V , T$_J$=55°C	---	---	5	
Gate-Source Leakage Current	I$_{GSS}$	V$_{GS}$=±12V , V$_{DS}$=0V	---	---	±100	nA
Forward Transconductance	gfs	V$_{DS}$=5V , I$_D$=3A	---	19	---	S
Gate Resistance	R$_g$	V$_{DS}$=0V , V$_{GS}$=0V , f=1MHz	---	1.5	3	Ω
Total Gate Charge (4.5V)	Q$_g$		---	8.34	11.7	nC
Gate-Source Charge	Q$_{gs}$	V$_{DS}$=15V , V$_{GS}$=4.5V , I$_D$=3A	---	1.26	1.8	
Gate-Drain Charge	Q$_{gd}$		---	1.88	2.6	
Turn-On Delay Time	T$_{d(on)}$		---	3.2	6.4	ns
Rise Time	T$_r$	V$_{DD}$=15V , V$_{GS}$=4.5V ,	---	41.8	75	
Turn-Off Delay Time	T$_{d(off)}$	R$_G$=3.3ΩI$_D$=3A	---	21.2	42	
Fall Time	T$_f$		---	6.4	12.8	
Input Capacitance	C$_{iss}$		---	662	927	pF
Output Capacitance	C$_{oss}$	V$_{DS}$=15V , V$_{GS}$=0V , f=1MHz	---	51.3	72	
Reverse Transfer Capacitance	C$_{rss}$		---	43.6	61	

➢ Diode Characteristics

| Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Continuous Source Current1,4	I$_S$	V$_G$=V$_D$=0V , Force Current	---	---	3.9	A
Pulsed Source Current2,4	I$_{SM}$		---	---	16	A
Diode Forward Voltage2	V$_{SD}$	V$_{GS}$=0V , I$_S$=1A , T$_J$=25°C	---	---	1.2	V
Reverse Recovery Time	t$_{rr}$		---	6.8	---	nS
Reverse Recovery Charge	Q$_{rr}$	I$_F$=3A , dI/dt=100A/μs , T$_J$=25°C	---	2.3	---	nC

Note :
1.Pulse width limited by maximum junction temperature.
2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
3.Ensure that the channel temperature does not exceed 150°C.
4.The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.
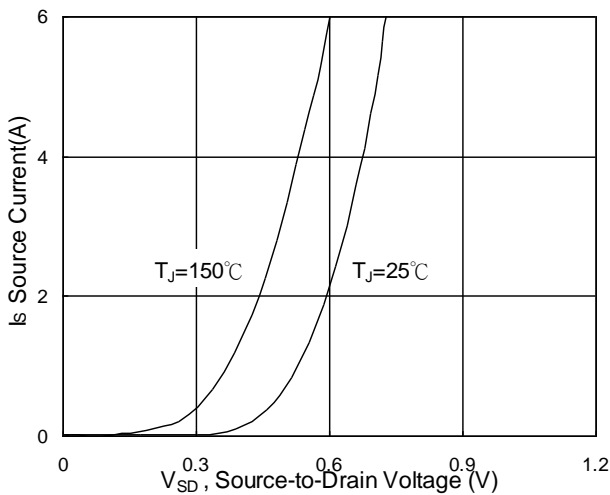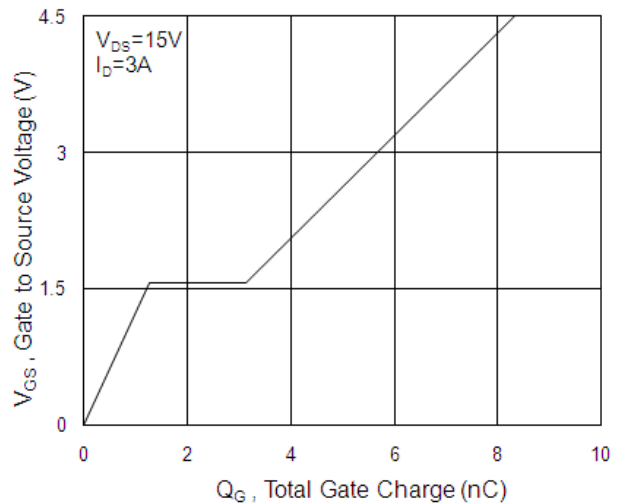
> ## Typical Characteristics
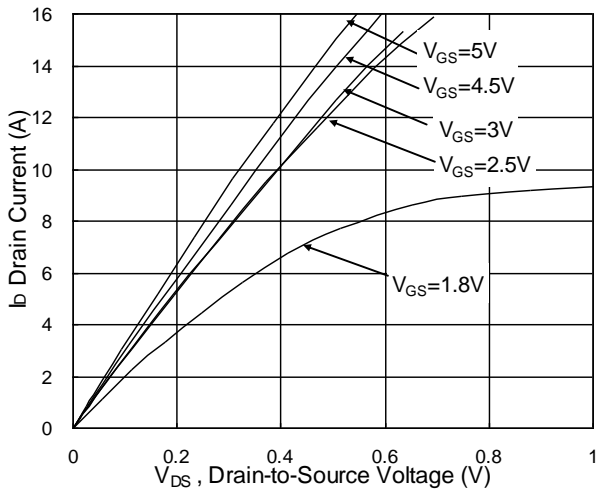
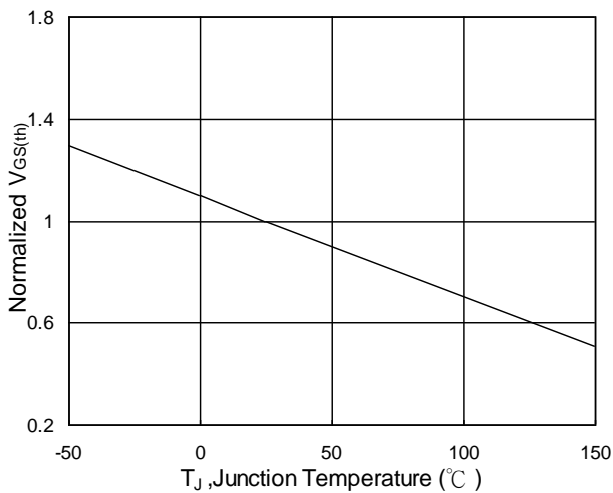**Fig.1 Typical Output Characteristics**
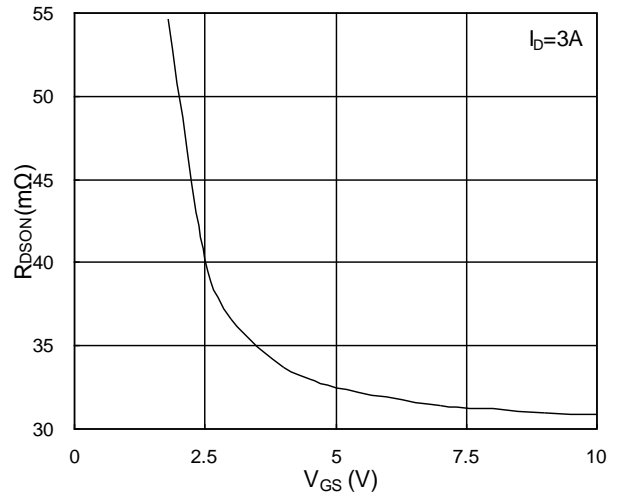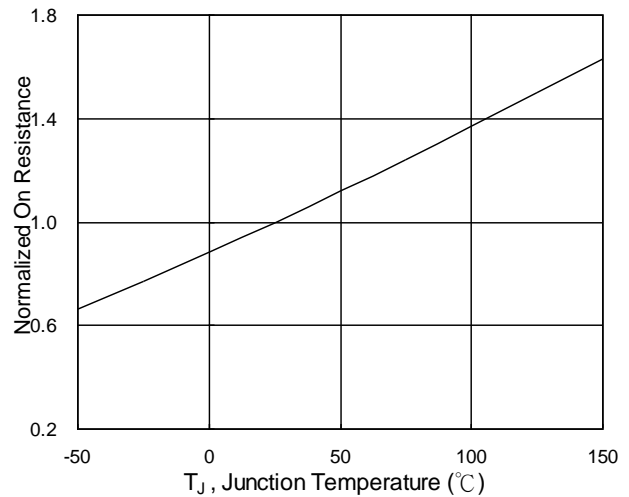

Fig.2 On-Resistance vs. Gate-Source
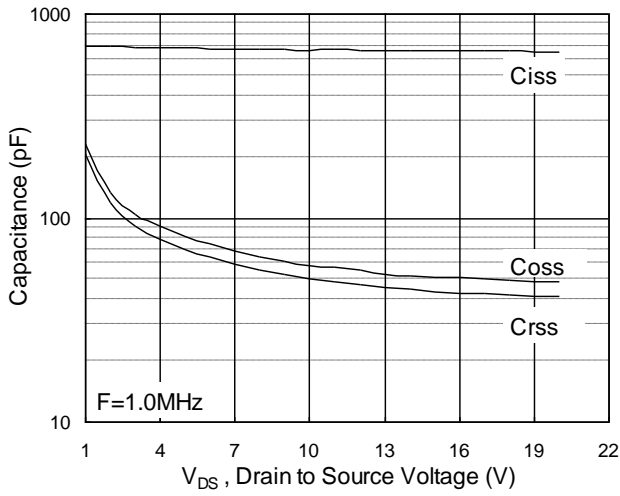

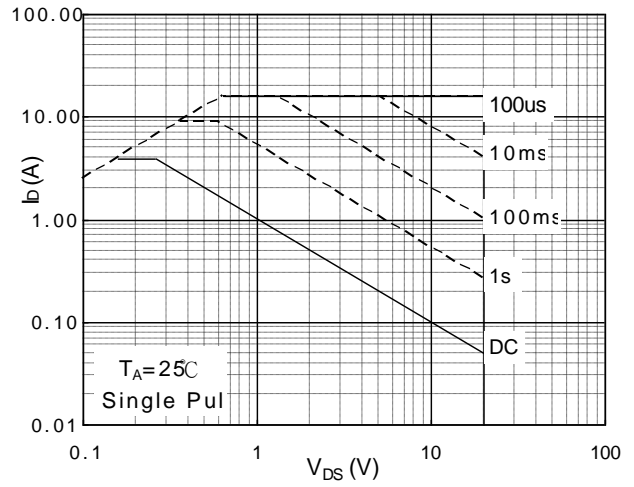**Fig.3 Forward Characteristics Of Reverse**

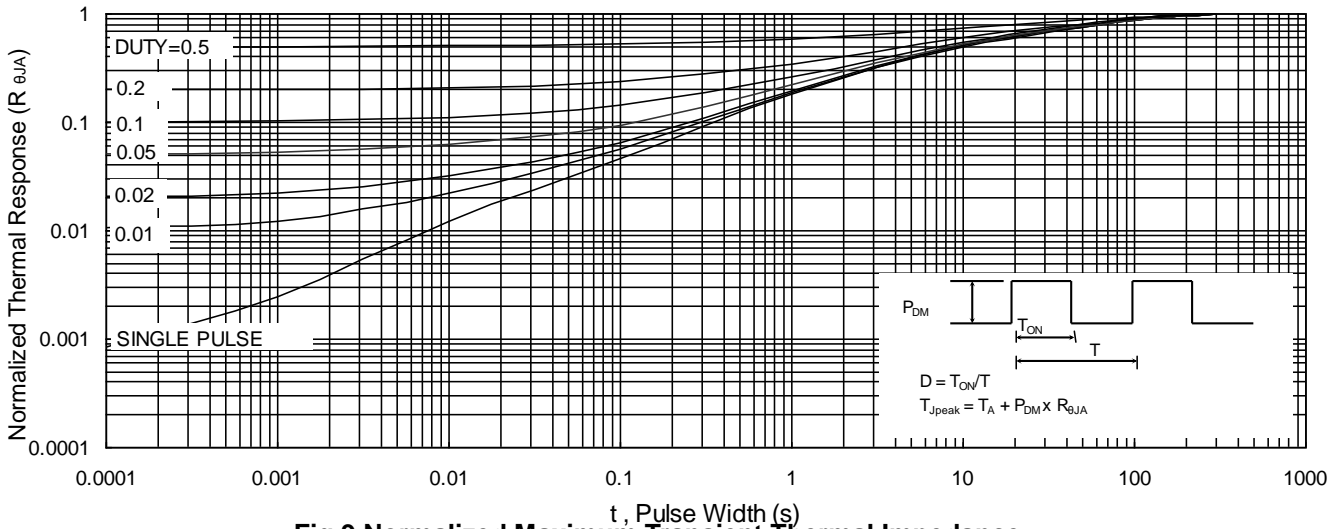**Fig.4 Gate-Charge Characteristics**

Fig.5 Normalized V_GS(th) vs. T_J

Fig.6 Normalized R_DSON vs. T_J

Fig.7 Capacitance

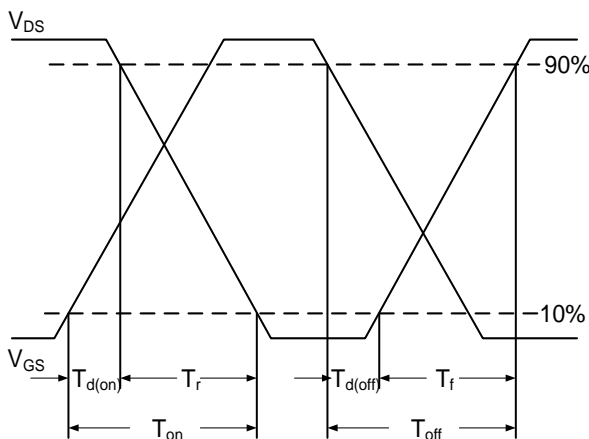**Fig.8 Safe Operating Area**

Fig.9 Normalized Maximum Transient Thermal Impedance

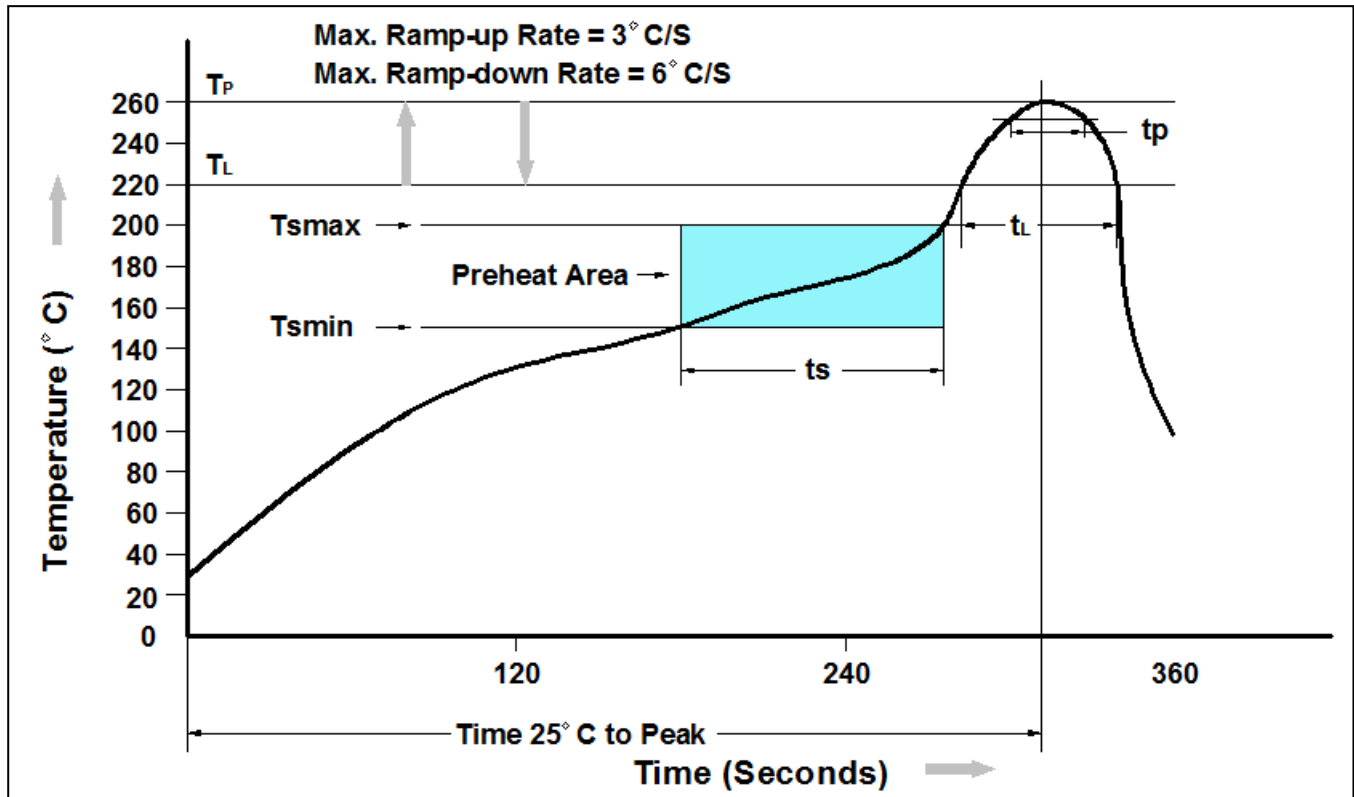$$D = T_{ON}/T$$
$$T_{Jpeak} = T_A + P_{DM} \times R_{\theta JA}$$

Fig.10 Switching Time Waveform
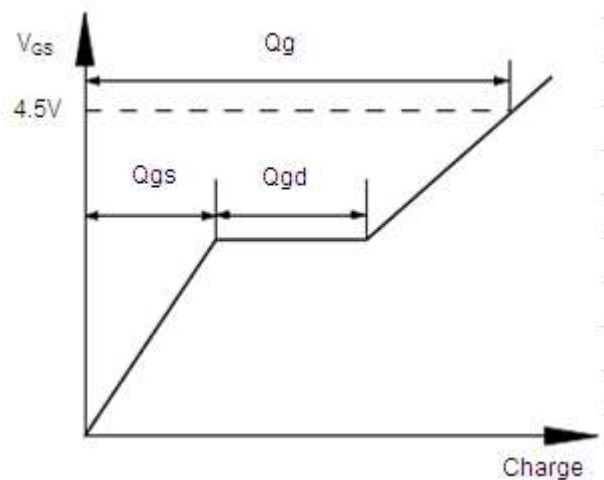
Fig.11 Gate Charge Waveform

➢ ## Recommand IR Reflow Soldering Thermal Profile

Profile Feature	Pb-Free Assembly Profile
Temperature Min. (Tsmin)	150°C
Temperature Max. (Tsmax)	200°C
Time (ts) from (Tsmin to Tsmax)	60-120 seconds
Average Ramp-up Rate (tL to tP)	3°C/second max.
Liquidous Temperature (TL)	217°C
Time (tL) Maintained Above (TL)	60 – 150 seconds
Peak Temperature	260°C +0°C / -5°C
Time (tP) within 5°C of actual Peak Temperature	30 seconds
Ramp-down Rate (TP to TL)	6°C/second max
Time 25°C to Peak Temperature	8 minutes max.

➢ ## Ordering Information

Part Number	Description	Quantity
PAN3514N	SOT-23 Reel	3000 pcs

> ## Package Information (SOT- 23)
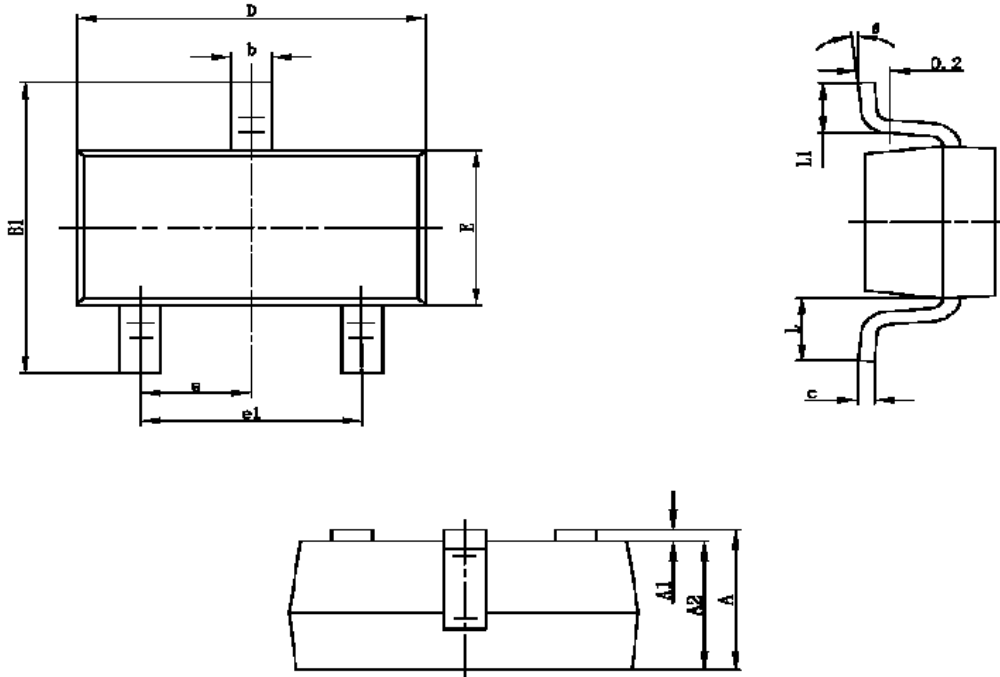
Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.400	0.012	0.016
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950TYP		0.037TYP	
e1	1.800	2.000	0.071	0.079
L	0.700REF		0.028REF	
L1	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

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