



SPN166T04A

N-Channel Enhancement Mode MOSFET

DESCRIPTION

The SPN166T04A is the N-Channel enhancement mode power field effect transistor which is produced using super high cell density DMOS trench technology. This high density process is especially tailored to minimize on-state resistance. These devices are particularly suitable for synchronous rectifier application, Motor control power management and other Power Tool circuits. It has been optimized for low gate charge, low $R_{DS(ON)}$ and fast switching speed.

FEATURES

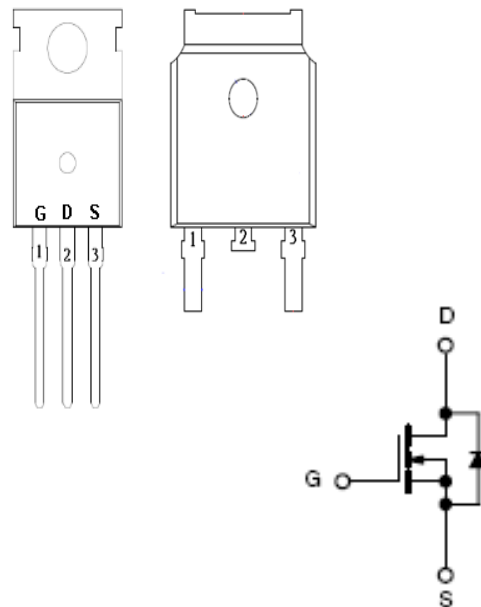
- ◆ 45V/166A, $R_{DS(ON)}=3.2m\Omega@V_{GS}=10V$
- ◆ Super high density cell design for extremely low $R_{DS(ON)}$
- ◆ Exceptional on-resistance and maximum DC current capability
- ◆ TO-220-3L/ TO-252-2L package design

APPLICATIONS

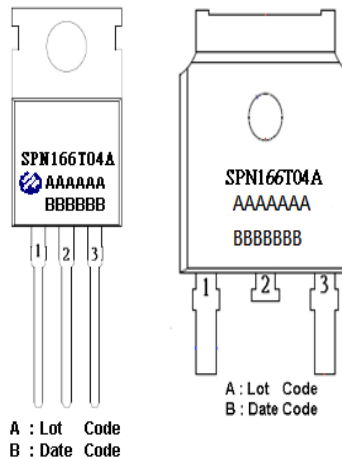
- DC/DC Converter
- Load Switch
- SMPS Secondary Side Synchronous Rectifier
- Motor Control
- Power Tool

PIN CONFIGURATION

TO-220-3L TO-252-2L



PART MARKING





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TO-220-3L/TO-252-2L PIN DESCRIPTION

Pin	Symbol	Description
1	G	Gate
2	D	Drain
3	S	Source

ORDERING INFORMATION

Part Number	Package	Part Marking
SPN166T04AT220TGB	TO-220-3L	SPN166T04A
SPN166T04AT252RGB	TO-252-2L	SPN166T04A

※ SPN166T04AT220TGB : Tube ; Pb – Free ; Halogen – Free

※ SPN166T04AT252RGB : Tape& Reel ; Pb – Free ; Halogen – Free

ABSOLUTE MAXIMUM RATINGS

(TA=25°C Unless otherwise noted)

Parameter	Symbol	Typical	Unit
Drain-Source Voltage	V _{DSS}	45	V
Gate –Source Voltage	V _{GSS}	±20	V
Continuous Drain Current (Silicon Limited) (TO-220/TO-252)	I _D	Tc=25°C	166
		Tc=100°C	118
Pulsed Drain Current	I _{DM}	350	A
Power Dissipation @ Tc=25°C	P _D	TO-220	104
Power Dissipation @ Tc=25°C		TO-252	93
Avalanche Energy with Single Pulse (Tc=25°C , L=0.5mH.)	E _{AS}	100	mJ
Operating Junction Temperature	T _J	-55/150	°C
Storage Temperature Range	T _{STG}	-55/150	°C
Thermal Resistance-Junction to Case (TO-220)	R _{θJC}	1.2	°C/W
Thermal Resistance-Junction to Case (TO-252)	R _{θJC}	1.35	°C/W

Note :

The maximum current rating is package limited at 120A for TO-220-3L

The maximum current rating is package limited at 70A for TO-252-2L



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ELECTRICAL CHARACTERISTICS

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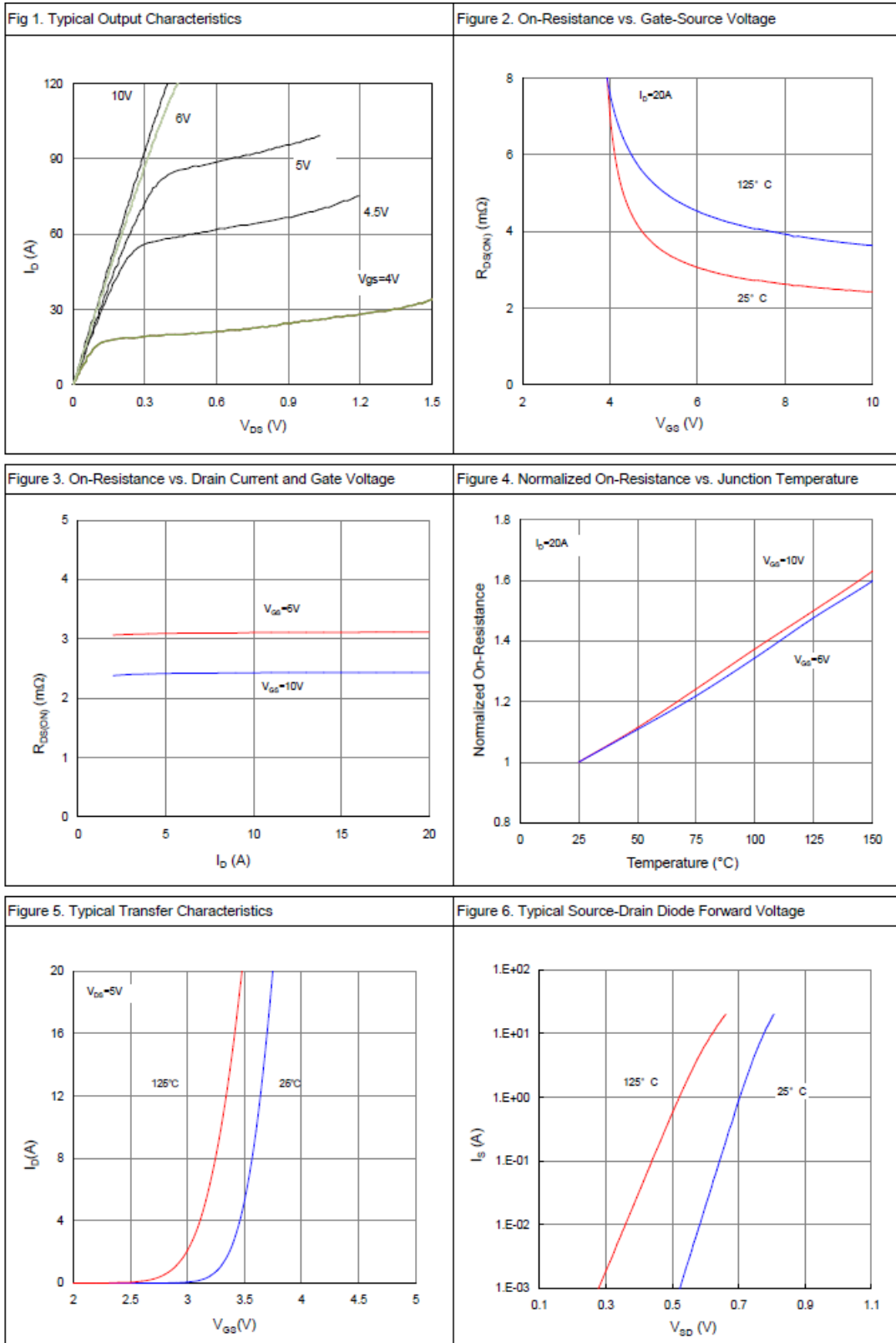
Parameter	Symbol	Conditions	Min.	Typ	Max.	Unit
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	45			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	2.5	4.0	
Gate Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=36V, V_{GS}=0V$ $T_J = 25^\circ C$			1	uA
		$V_{DS}=36V, V_{GS}=0V$ $T_J = 100^\circ C$			100	
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=20A$		2.5	3.2	mΩ
Forward Transconductance	g_{fs}	$V_{DS}=5V, I_D=20A$		85		S
Gate Resistance	R_G	$V_{GS}=0V, V_{DS}$ open, $f=1MHz$		1.5		Ω
Diode Forward Voltage	V_{SD}	$I_S=20A, V_{GS}=0V$		0.9	1.2	V
Dynamic						
Total Gate Charge (10V)	Q_g	$V_{DS}=20V, V_{GS}=10V$ $I_D = 20A$		54		nC
Gate-Source Charge	Q_{gs}			14		
Gate-Drain Charge	Q_{gd}			7		
Input Capacitance	C_{iss}	$V_{DS}=20V, V_{GS}=0V$ $f=1MHz$		3834		pF
Output Capacitance	C_{oss}			1348		
Reverse Transfer Capacitance	C_{rss}			70		
Turn-On Time	$t_{d(on)}$	$V_{DD}=20V, I_D=20A$ $V_{GEN}=10V, R_G=10\Omega$		14		nS
	t_r			12		
Turn-Off Time	$t_{d(off)}$			58		
	t_f			15		



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TYPICAL CHARACTERISTICS

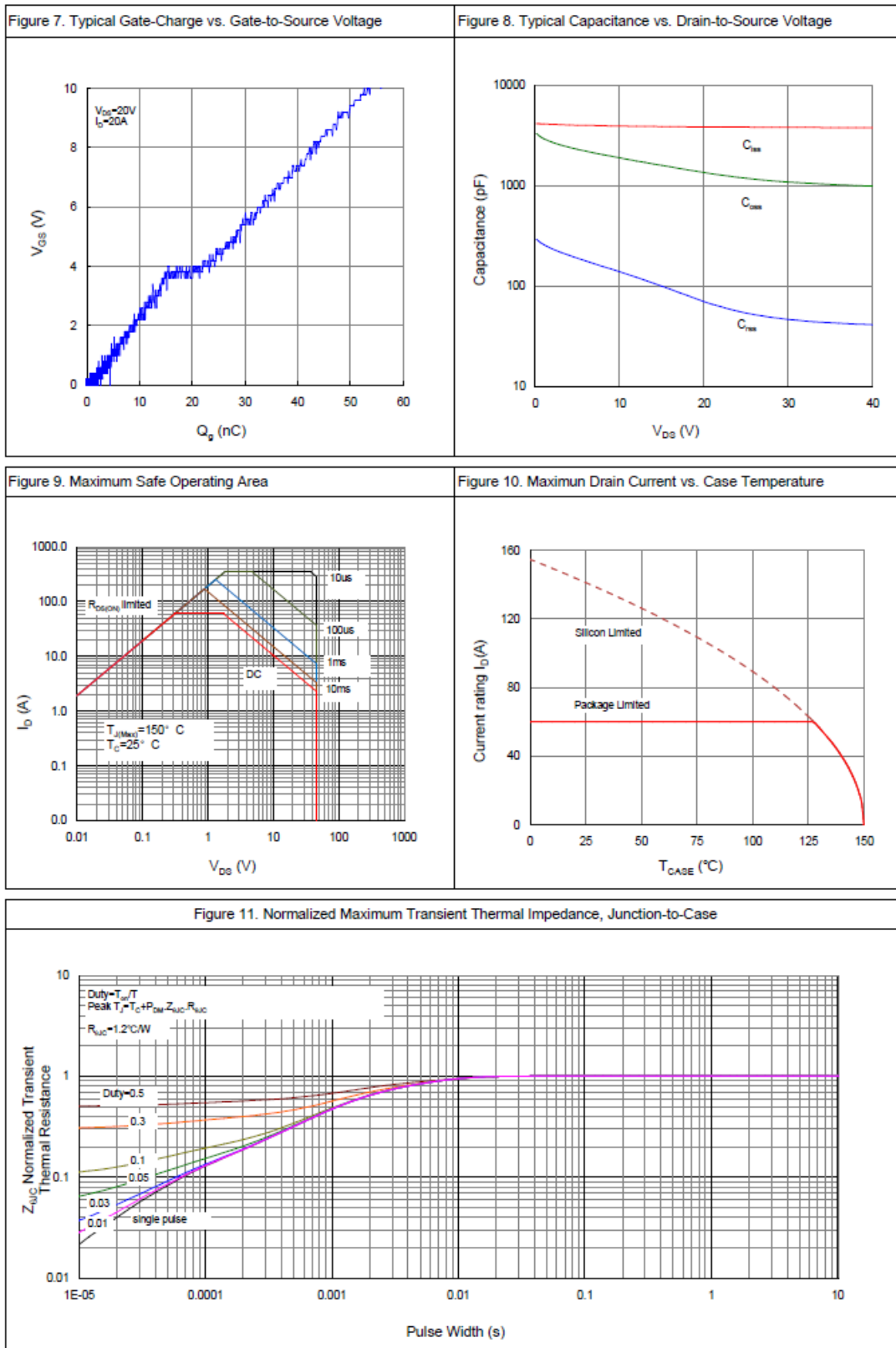




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TYPICAL CHARACTERISTICS

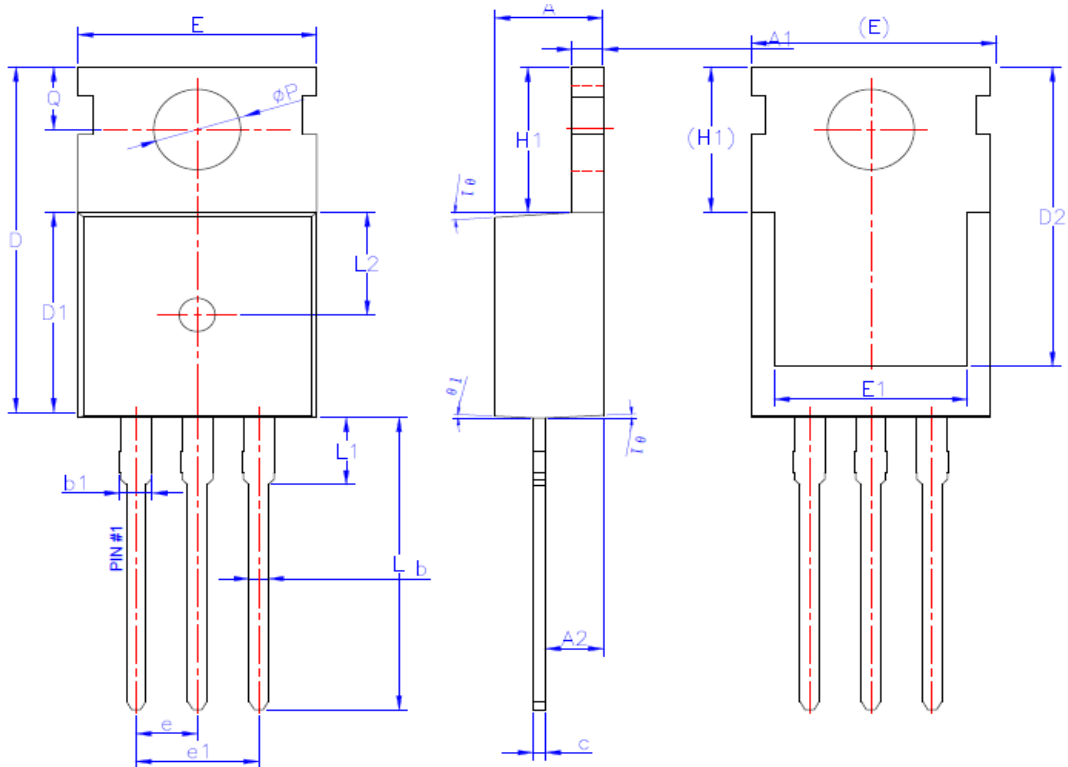




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TO-220-3L PACKAGE OUTLINE



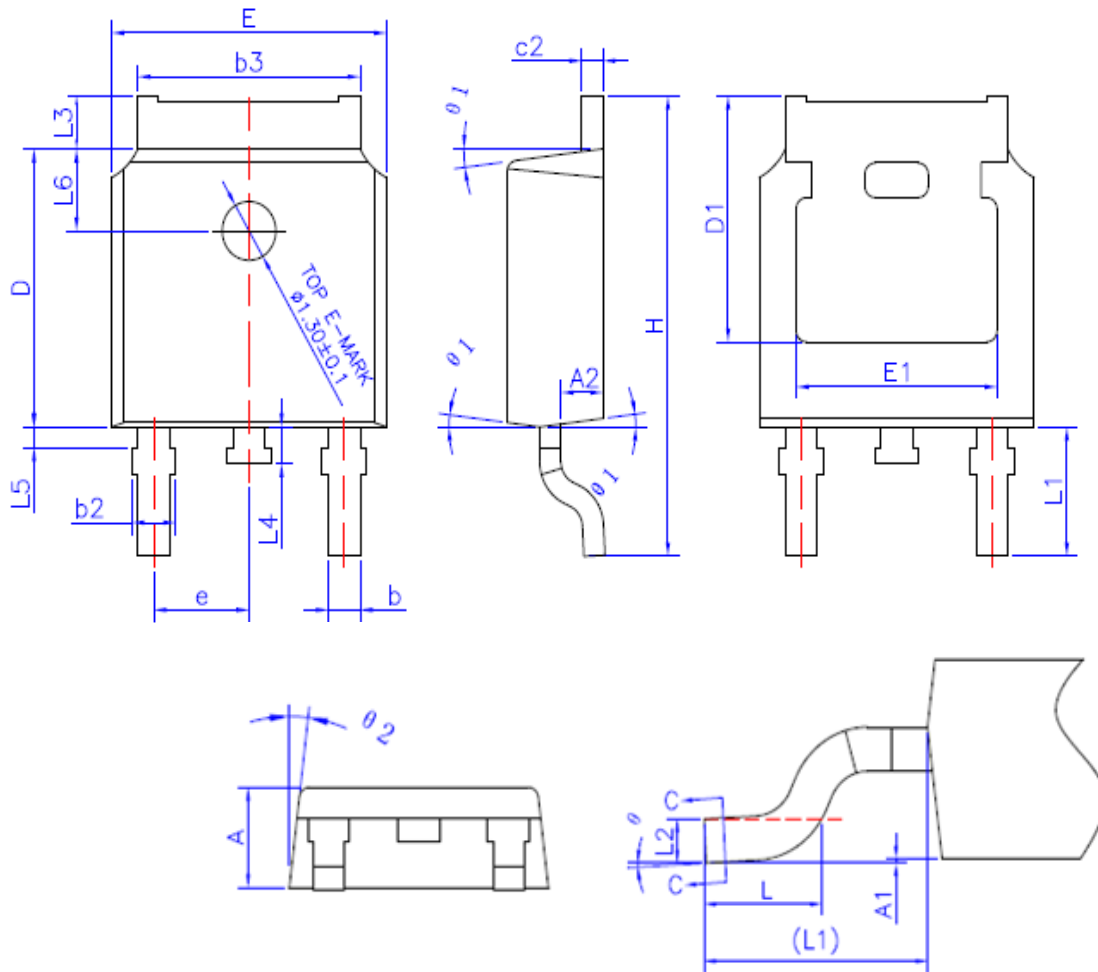
SYMBOL	MIN	NOM	MAX
A	4.40	4.50	4.60
A1	1.27	1.30	1.33
A2	2.30	2.40	2.50
b	0.70	0.60	0.90
b1	-	-	1.40
c	0.45	0.50	0.60
D	15.30	15.70	16.10
D1	9.10	9.20	9.30
D2	13.10	-	13.70
E	9.70	9.90	10.20
E1	7.80	8.00	8.20
e	2.54BSC		
e1	5.08BSC		
H1	6.30	6.50	6.70
L	12.78	13.08	13.38
L1	-	-	3.50
L2	4.6REF		
ϕP	3.55	3.60	3.65
Q	2.73	-	2.87
$\theta 1$	1°	3°	5°



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TO-252-2L PACKAGE OUTLINE



SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.00	--	0.15
A2	0.90	1.01	1.10
b	0.72	-	0.85
b2	0.72	--	0.90
b3	5.13	5.33	5.46
c	0.47	--	0.60
c2	0.47	--	0.60
D	6.00	6.10	6.20
D1	5.25	--	--
E	6.40	6.60	6.80
E1	4.70	--	--
e	2.3REF		
H	9.80	10.10	10.40
L	1.40	1.60	1.80
L1	2.90REF		
L2	0.508BSC		
L3	0.90	--	1.25
L4	0.60	0.80	1.00
L5	0.15	--	0.75
L6	1.80REF		
theta	0°	3°	8°
theta 1	5°	7°	9°
theta 2	5°	7°	9°



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SYNC Power Corporation

7F-2, No.3-1, Park Street

NanKang District (NKSP), Taipei, Taiwan 115

Phone: 886-2-2655-8178

Fax: 886-2-2655-8468

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