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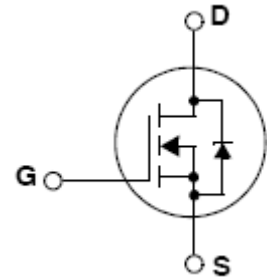
# BF912N60/ BF912N60L

## 600V N-Channel MOSFET

### General Description

These N-Channel enhancement mode power field effect transistors are produced using DMOS technology.

This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode. These devices are well suited for high efficiency switched mode power supplies, active power factor correction, electronic lamp ballasts based on half bridge topology.



### Features

- $V_{DS} = 600\text{ V}$
- $I_D = 12\text{ A}$
- $R_{DS(ON)} = 0.5\ \Omega$  TYP ( $V_{GS} = 10\text{ V}, I_D = 6.0\text{ A}$ )
- Low  $C_{RSS}$  (typical 17pF)
- Fast switching



### Absolute Maximum Ratings

Symbol	Parameter	BF912N60L	BF912N60	Unit
$V_{DS}$	Drain-Source Voltage	600		V
$I_D$	Drain Current(continuous)at $T_c = 25^\circ\text{C}$	12		A
$I_{DM}$	Drain Current (pulsed) (Note1)	48		A
$V_{GS}$	Gate-Source Voltage	$\pm 30$		V
$E_{AS}$	Single PulseAvalancheEnergy (Note2)	628		mJ
$I_{AR}$	Avalanche Current (Note1)	12		A
$E_{AR}$	RepetitiveAvalancheEnergy (Note1)	25		mJ
$dv/dt$	PeakDiodeRecovery $dv/dt$ (Note3)	5.0		V/ns
$P_D$	Power Dissipation ( $T_c = 25^\circ\text{C}$ )	250	50	W
$T_{stg}$	Storage Temperature Range	-55 to +150		$^\circ\text{C}$
$T_L$	Maximum Lead Temperature for Soldering Purpose	300		$^\circ\text{C}$



## Ordering Information

Part Number	Package	Packaging
BF912N60	TO-220F	Tube
BF912N60L	TO-220	Tube

## Thermal Data

Symbol	Parameter	TO-220F	TO-220	Unit
Rthj-case	Thermal Resistance Junction-case	2.5	0.5	°C /W
Rthj-amb	Thermal Resistance Junction-ambient	62.5	62.5	°C /W

Electrical Characteristics(T<sub>c</sub> = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	I <sub>D</sub> =250uA, V <sub>GS</sub> =0V	600			V
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V			1	uA
		V <sub>DS</sub> =600V, V <sub>GS</sub> =0V, T <sub>c</sub> =125°C			10	uA
I <sub>GSS</sub>	Gate-Body Leakage Current	V <sub>GS</sub> =±30V, V <sub>DS</sub> =0V			±100	nA
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2.0		4.0	V
R <sub>DS(on)</sub>	Static Drain-Source On Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =6.0A		0.53	0.65	Ω
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, f=1MHZ, V <sub>GS</sub> =0V		2000		pF
C <sub>oss</sub>	Output Capacitance			164		pF
C <sub>rss</sub>	Reverse Transfer Capacitance			17		pF
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =300V, I <sub>D</sub> =6A V <sub>GS</sub> =10V, R <sub>G</sub> =4.7Ω (Note4,5)		40		ns
t <sub>r</sub>	Rise Time			19		ns
t <sub>d(off)</sub>	Turn-Off Delay Time			136		ns
t <sub>f</sub>	Fall Time			23		ns
Q <sub>g</sub>	Total Gate Charge	V <sub>DD</sub> =480V, I <sub>D</sub> =12A V <sub>GS</sub> =10V (Note4,5)		45		nC
Q <sub>gs</sub>	Gate-Source Charge			10		nC
Q <sub>gd</sub>	Gate-Drain Charge			20		nC
V <sub>SD(*)</sub>	Forward On Voltage	I <sub>F</sub> =12A, V <sub>GS</sub> =0V		0.85	1.2	V
T <sub>rr</sub>	Reverse Recovery Time	V <sub>DD</sub> =300V, I <sub>F</sub> =12A, di/dt=100A/us (Note4)		425		ns

## Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
  2. L = 8mH, I<sub>AS</sub> = 12 A, V<sub>DD</sub> = 50V, R<sub>G</sub> = 25 Ω, Starting T<sub>J</sub> = 25°C
  3. I<sub>SD</sub> ≤ 12A, di/dt ≤ 200A/μs, V<sub>DD</sub> ≤ BV<sub>DSS</sub>, Starting T<sub>J</sub> = 25°C
  4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
  5. Essentially independent of operating temperature
- (\*).Pulsed:Pulse duration

Typical characteristics (25°C unless noted)

Figure 1 Output Characteristics

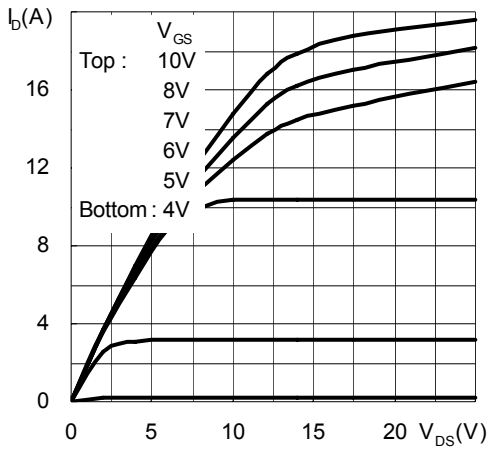


Figure 2 Transfer Characteristics

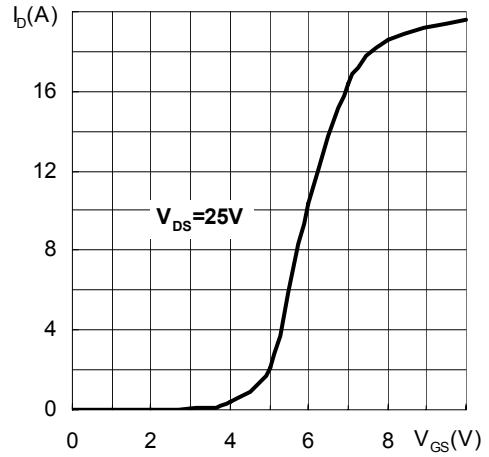


Figure 3 Normalized Threshold Voltage vs. Temperature

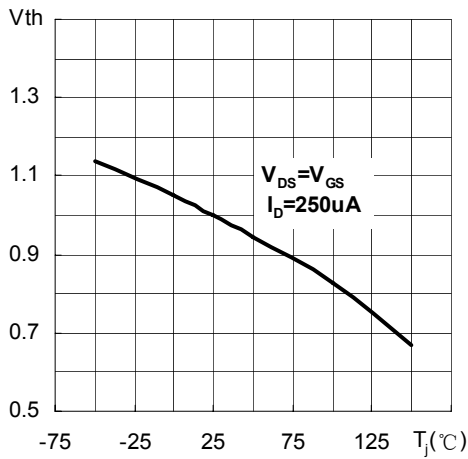


Figure 4 Normalized  $BV_{DSS}$  vs. Temperature

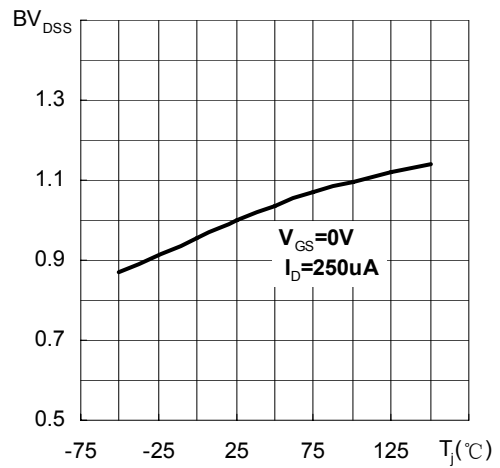


Figure 5 Normalized on Resistance vs. Temperature

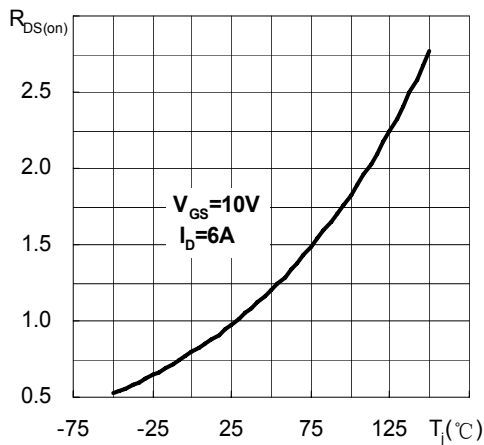


Figure 6 Source-Drain Diode Forward Characteristics

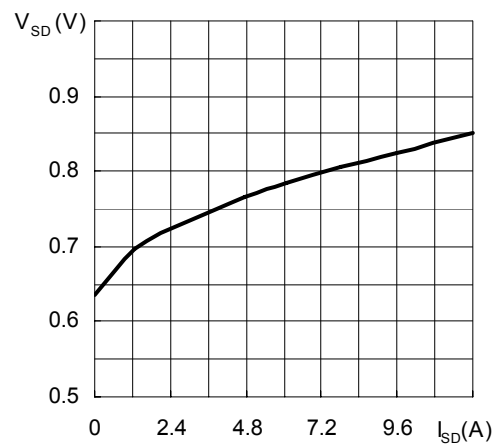




Figure 7 Capacitance

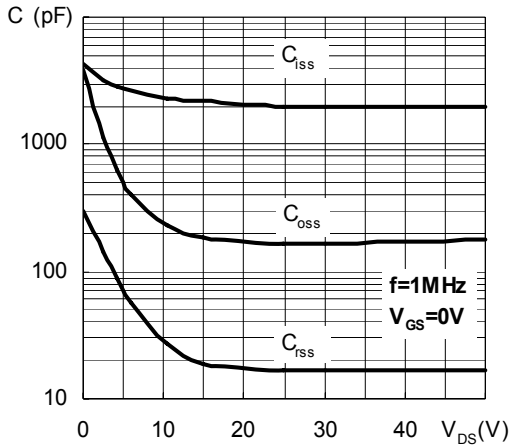


Figure 8 Gate Charge

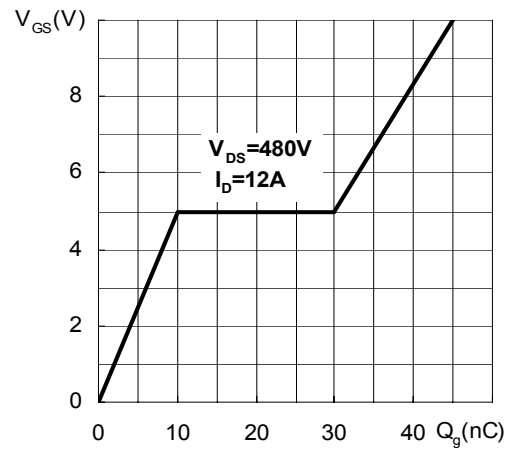


Figure 9-1 Maximum Safe Operating Area For BF912N60

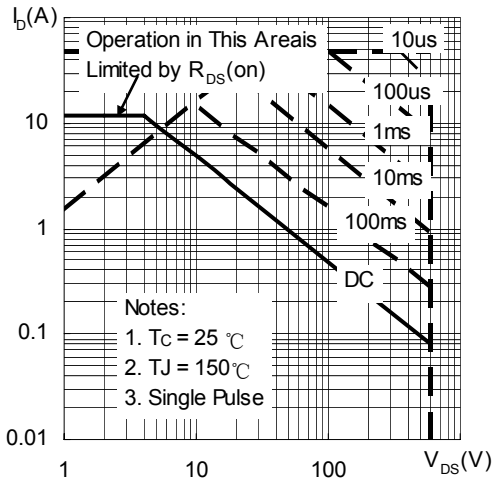


Figure 9-2 Maximum Safe Operating Area For BF912N60L

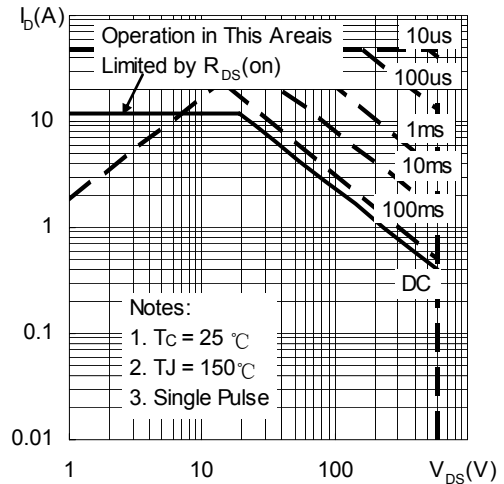


Figure 10 Maximum Drain Current vs Case Temperature

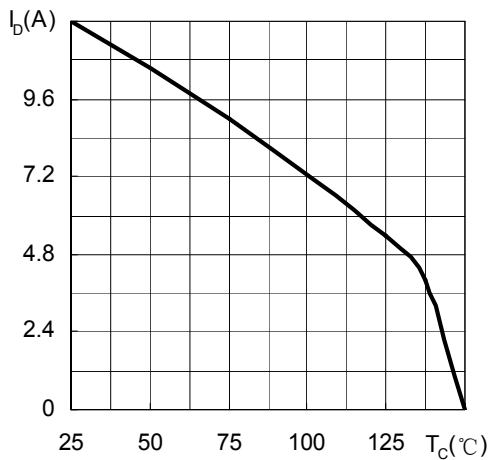




Figure 11-1 Maximum Transient Thermal Impedance For BF912N60

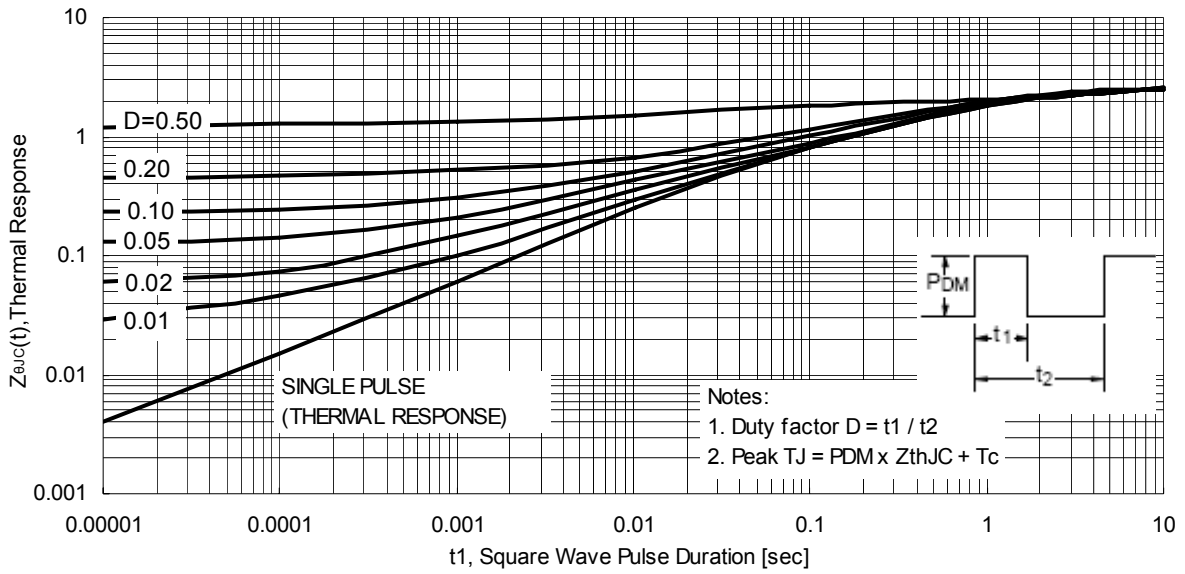
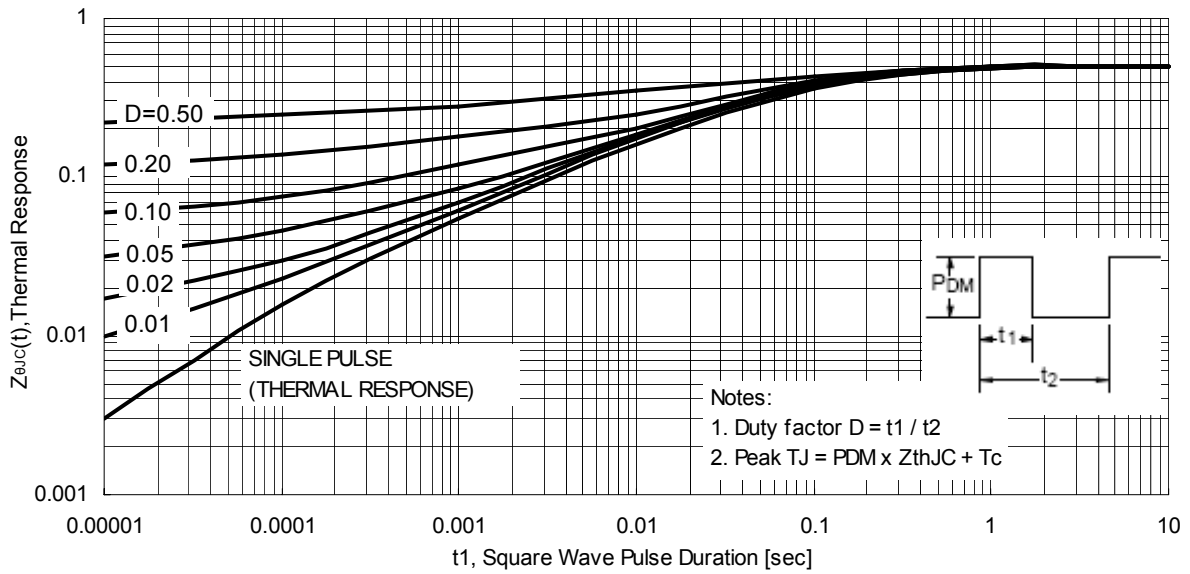
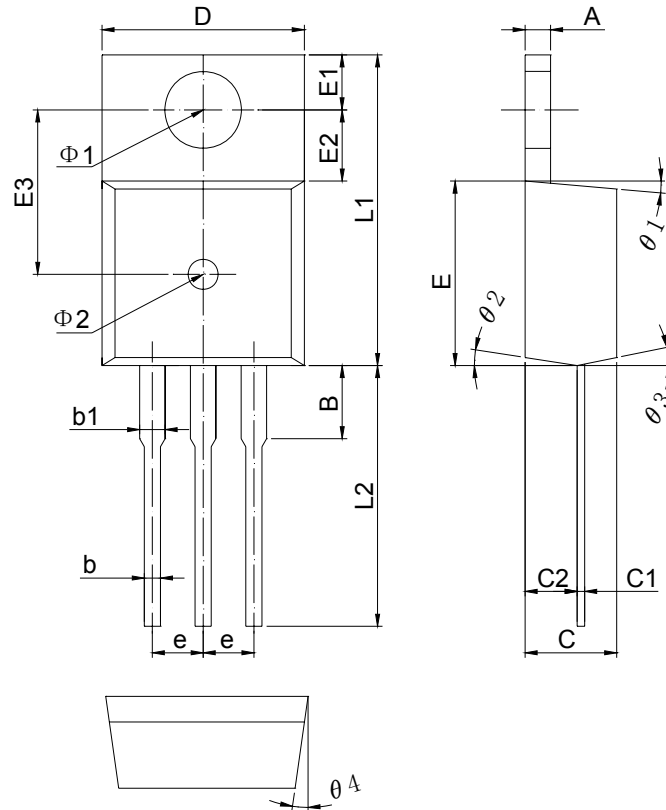


Figure 11-2 Maximum Transient Thermal Impedance For BF912N60L



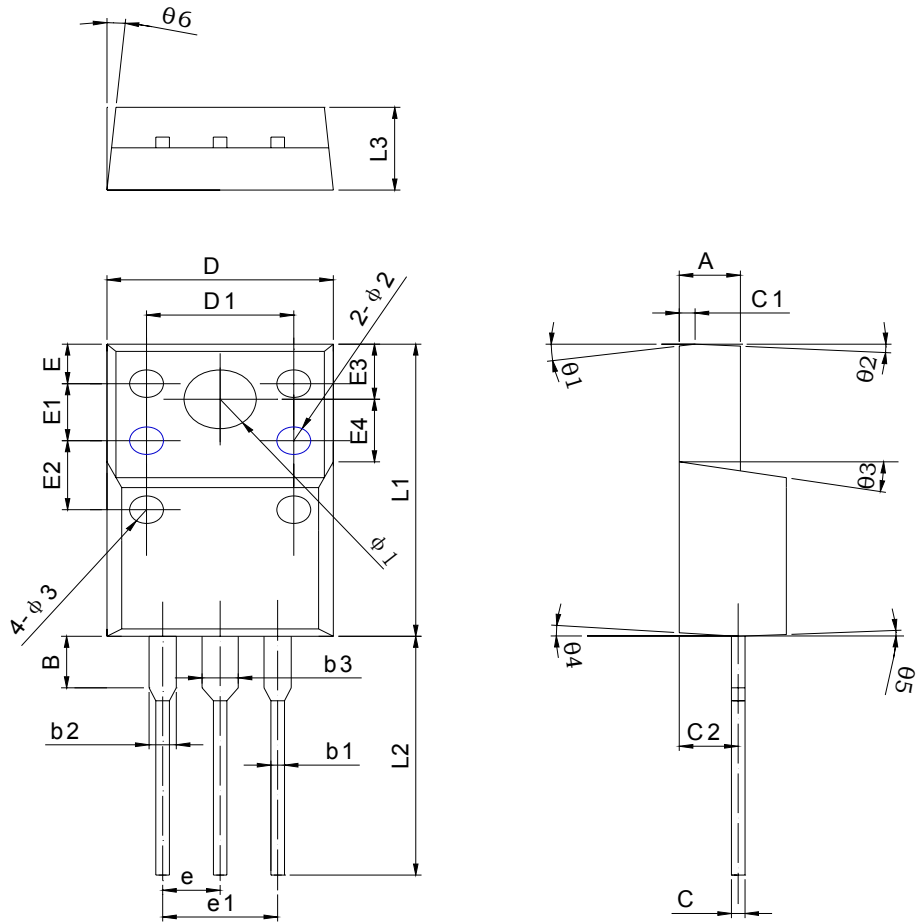
Package Drawing  
TO-220



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	-	1.27	-	-	0.050	-
B	-	3.65	-	-	0.144	-
b	-	0.81	-	-	0.032	-
b1	-	1.27	-	-	0.050	-
C	-	4.58	-	-	0.180	-
C1	-	0.38	-	-	0.015	-
C2	-	2.60	-	-	0.102	-
D	10.10	10.12	10.14	0.398	0.398	0.399
E	-	9.20	-	-	0.362	-
E1	-	2.74	-	-	0.108	-
E2	-	3.55	-	-	0.140	-
E3	-	8.20	-	-	0.323	-
e	2.515	2.54	2.565	0.099	0.100	0.101
L1	15.47	15.49	15.51	0.609	0.610	0.611
L2	13.00	-	-	0.512	-	-
$\theta 1$	3°			3°		
$\theta 2$	3°			3°		
$\theta 3$	3°			3°		
$\theta 4$	3°			3°		
$\phi 1$	3.84			0.151		
$\phi 2$	1.5			0.059		



**TO-220F**





Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min	Nom	Max	Min	Nom	Max
A	2.50	2.70	2.90	0.098	0.106	0.114
B	2.60	2.80	3.00	0.102	0.110	0.118
b1	0.50	0.60	0.70	0.020	0.024	0.028
b2	1.10	1.20	1.30	0.043	0.047	0.051
b3	-	1.60	-	-	0.063	-
C	0.55	0.60	0.65	0.022	0.024	0.026
C1	-	0.60	-	-	0.024	-
C2	2.40	2.60	2.80	0.094	0.102	0.110
D	9.80	10.00	10.20	0.386	0.394	0.402
D1	-	6.50	-	-	0.256	-
E	-	2.15	-	-	0.085	-
E1	-	3.10	-	-	0.122	-
E2	-	3.75	-	-	0.148	-
E3	2.90	3.00	3.10	0.114	0.118	0.122
E4	3.30	3.40	3.50	0.130	0.134	0.138
e	-	2.54	-	-	0.100	-
e1	4.98	5.08	5.18	0.196	0.200	0.204
L1	14.80	15.00	15.20	0.583	0.591	0.598
L2	13.00	13.20	13.40	0.512	0.520	0.528
L3	4.30	4.50	4.70	0.169	0.177	0.185
θ1	5°			5°		
θ2	3°			3°		
θ3	10°			10°		
θ4	5°			5°		
θ5	3°			3°		
θ6	5°			5°		
φ1	3.00	3.20	3.40	0.118	0.126	0.134
φ2	1.50 深 1.2 头部 160°			1.50 深 1.2 头部 160°		
φ3	1.50 深 0.1			1.50 深 0.1		





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