



BYD Microelectronics Co., Ltd.

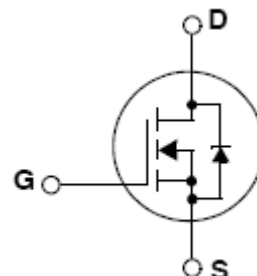
BF96N60/ BF96N60L

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

- $V_{DS} = 600\text{ V}$
- $I_D = 6\text{ A}$
- $R_{DS(ON)} = 1.7\ \Omega$ TYP ($V_{GS} = 10\text{ V}, I_D = 3.0\text{ A}$)
- Low C_{RSS} (typical 7.0pF)
- Fast switching



Absolute Maximum Ratings

Symbol	Parameter	BF96N60L	BF96N60	Unit
V_{DS}	Drain-Source Voltage	600		V
I_D	Drain Current(continuous)at $T_c = 25^\circ\text{C}$	6		A
I_{DM}	Drain Current (pulsed) (Note1)	24		A
V_{GS}	Gate-Source Voltage	± 30		V
E_{AS}	SinglePulseAvalanche Energy (Note2)	190		mJ
I_{AR}	Avalanche Current (Note1)	6		A
E_{AR}	RepetitiveAvalancheEnergy (Note1)	12.5		mJ
dv/dt	PeakDiodeRecovery dv/dt (Note3)	5		V/ns
P_D	Power Dissipation ($T_c = 25^\circ\text{C}$)	125	40	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
BF96N60	TO-220F	Tube
BF96N60L	TO-220	Tube

Thermal Data

Symbol	Parameter	TO-220F	TO-220	Unit
Rthj-case	Thermal Resistance Junction-case	3.1	1.0	°C /W
Rthj-amb	Thermal Resistance Junction-ambient	62.5	62.5	°C /W

Electrical Characteristics(T_c = 25°C)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-Source Breakdown Voltage	I _D =250uA, V _{GS} =0V	600			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =600V, V _{GS} =0V			1	uA
		V _{DS} =600V, V _{GS} =0, T _c =125°C			10	uA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±30V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =250uA	2.0		4.0	V
R _{DS(on)}	Static Drain-Source On Resistance	V _{GS} =10V, I _D =3.0A		1.7	2.1	Ω
C _{iss}	Input Capacitance	V _{DS} =25V, f=1MHZ, V _{GS} =0V		938		pF
C _{oss}	Output Capacitance		64		pF	
C _{rss}	Reverse Transfer Capacitance		7.0		pF	
t _{d(on)}	Turn-On Delay Time	V _{DD} =300V, I _D =3A V _{GS} =10V, R _G =4.7Ω (Note4,5)		25		ns
t _r	Rise Time		15		ns	
t _{d(off)}	Turn-Off Delay Time		60		ns	
t _f	Fall Time		15		ns	
Q _g	Total Gate Charge	V _{DD} =480V, I _D =6A V _{GS} =10V (Note4,5)		23.4		nC
Q _{gs}	Gate-Source Charge		8.2		nC	
Q _{gd}	Gate-Drain Charge		6.4		nC	
V _{SD} (*)	Forward On Voltage	I _F =6A, V _{GS} =0V		0.82	1.2	V
T _{rr}	Reverse Recovery Time	V _{DD} =300V, I _F =6A, di/dt=100A/us (Note4)		400		ns

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
 2. L = 10mH, I_{AS} = 6 A, V_{DD} = 50V, R_G = 25 Ω, Starting T_J = 25°C
 3. I_{SD} ≤ 6A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 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

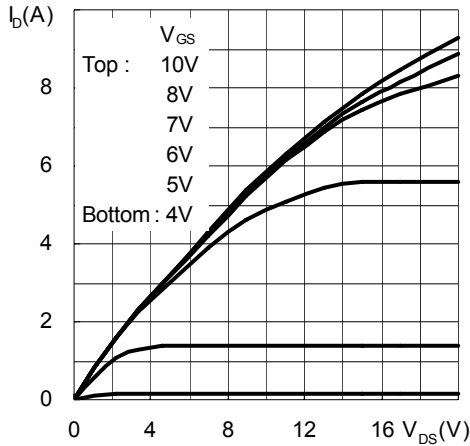


Figure 2 Transfer Characteristics

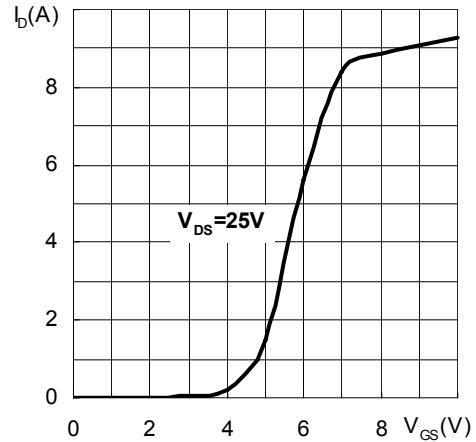


Figure 3 Normalized Threshold Voltage vs. Temperature

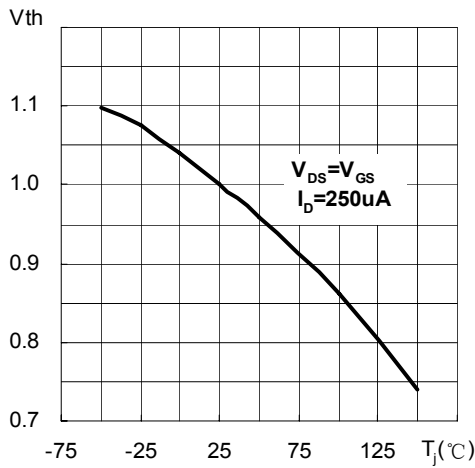


Figure 4 Normalized BV_{DSS} vs. Temperature

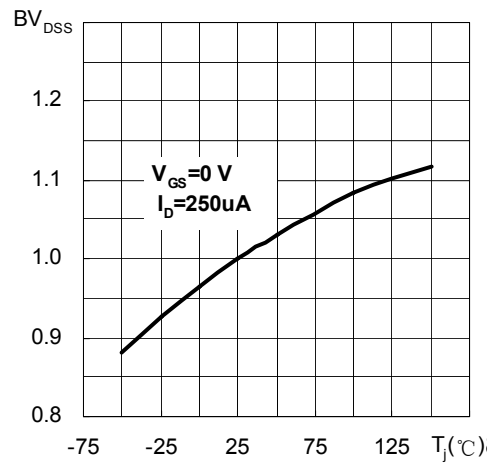


Figure 5 Normalized on Resistance vs Temperature

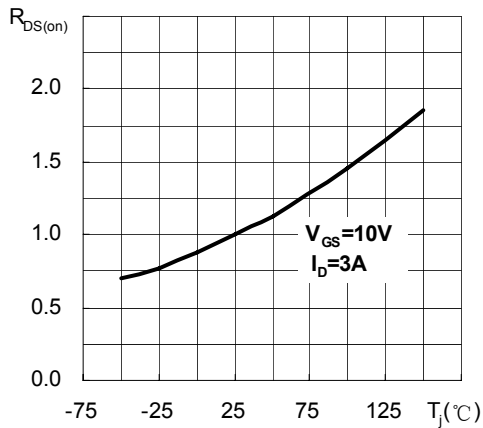


Figure 6 Source-Drain Diode Forward Characteristics

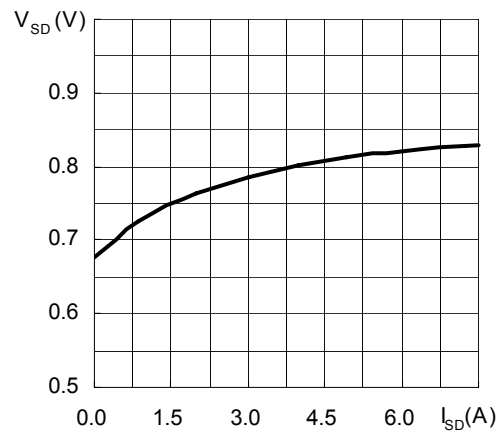




Figure 7 Capacitance

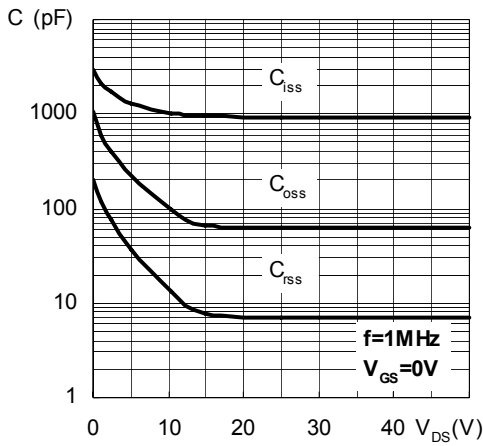


Figure 8 Gate Charge

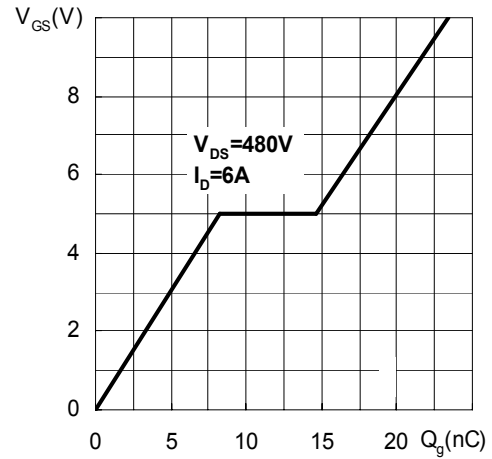


Figure 9-1 Safe Operating Area For BF96N60

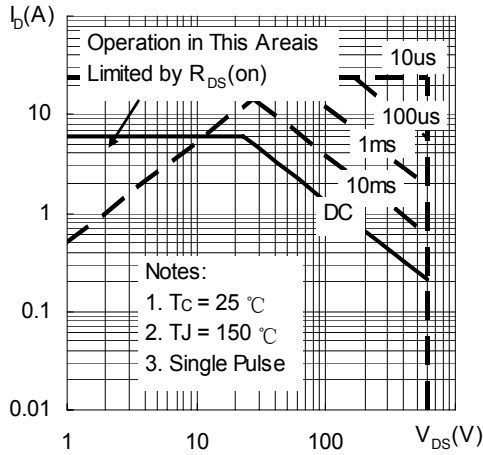


Figure 9-2 Safe Operating Area For BF96N60L

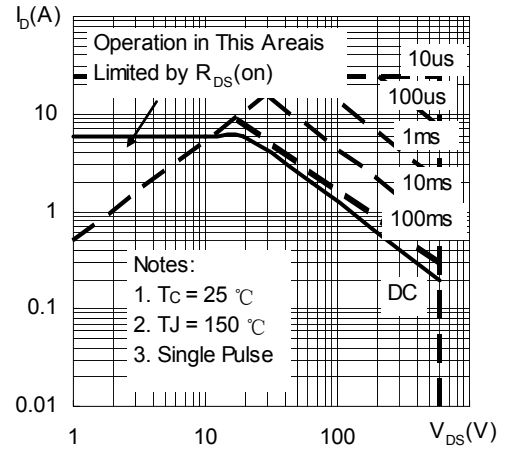


Figure 10 Maximum Drain Current vs Case Temperature

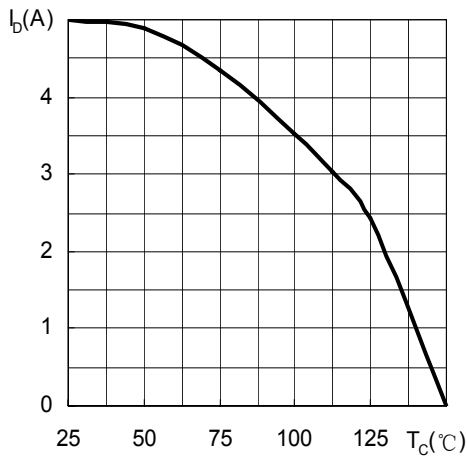


Figure 11-1 Maximum Transient Thermal Impedance For BF96N60

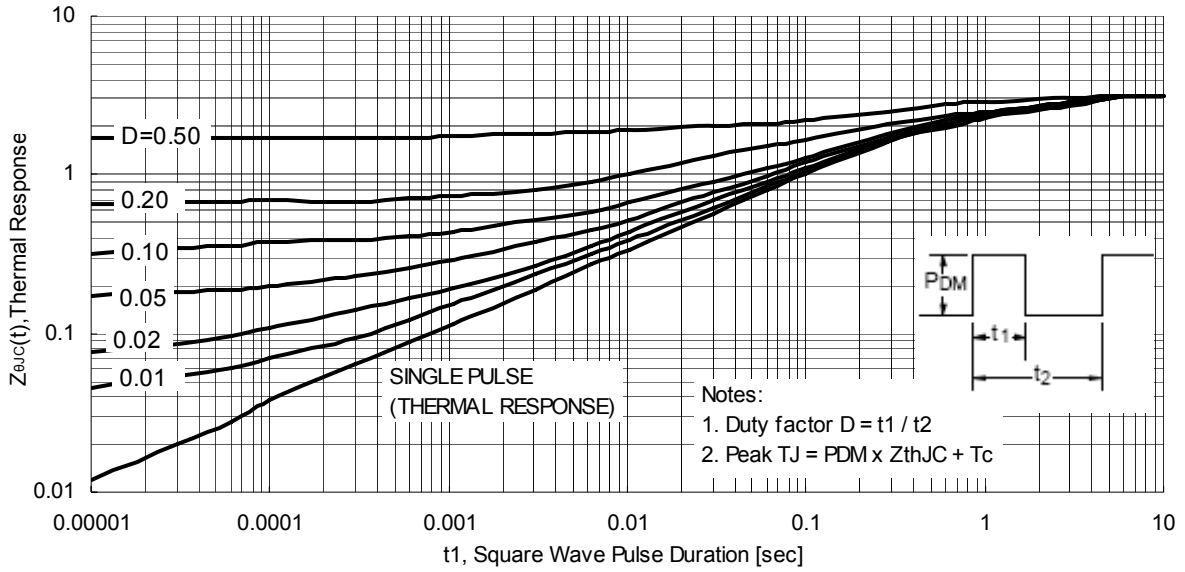
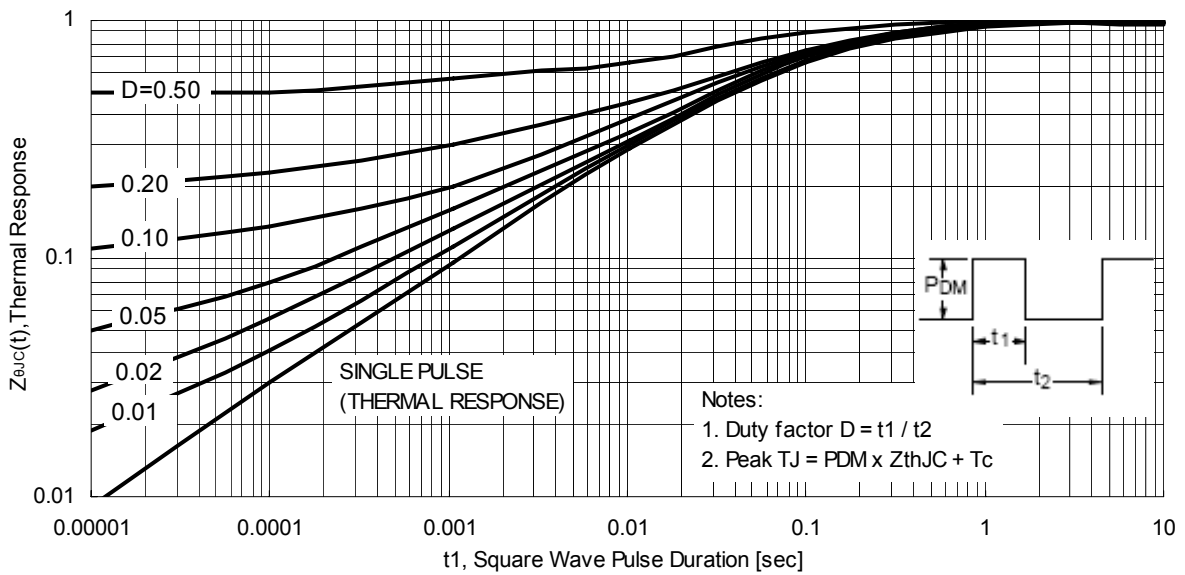
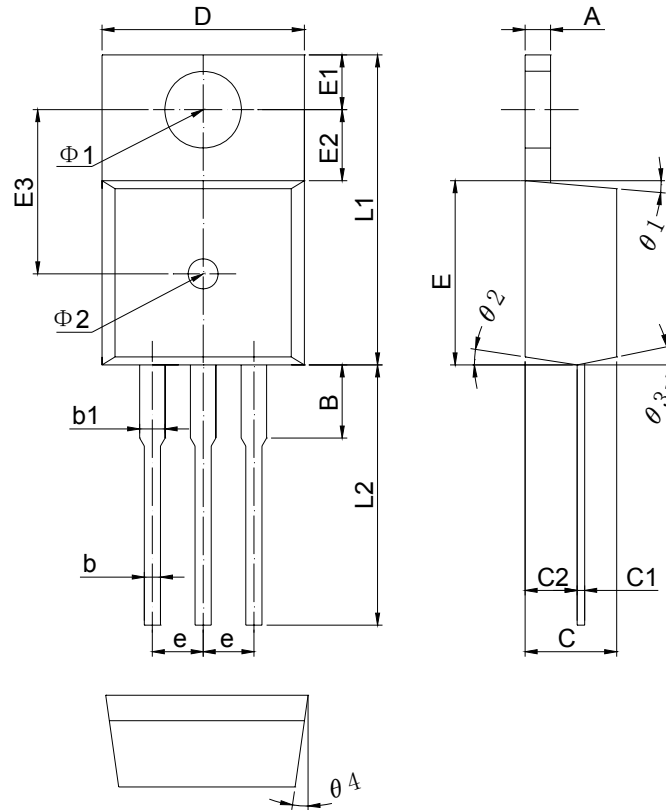


Figure 11-2 Maximum Transient Thermal Impedance For BF96N60L



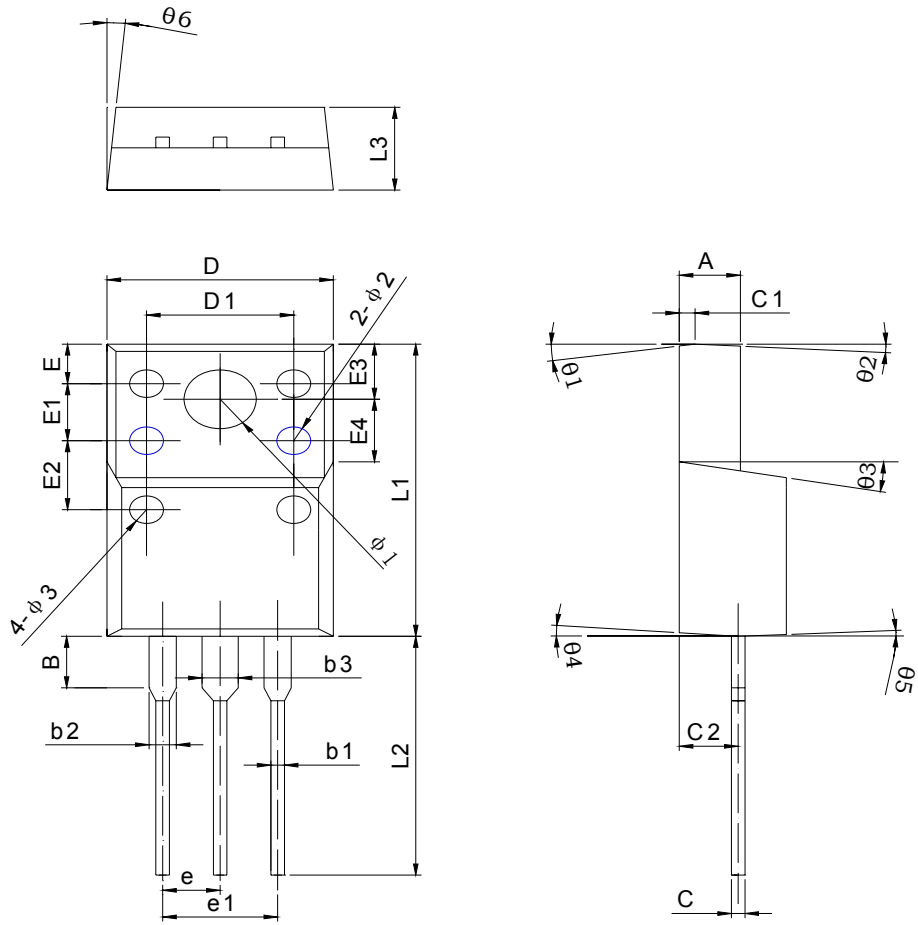


Package Drawing
TO-220



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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