

**General Description**

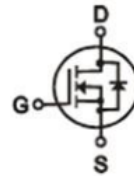
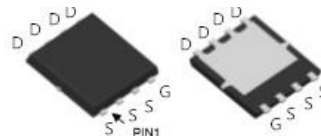
The ZM094N03M combines advanced trench MOSFET technology with a low resistance package to provide extremely low  $R_{DS(ON)}$ . This device is ideal for load switch and battery protection applications.

**Features**

- Low  $R_{DS(ON)}$  to minimize conductive loss
- Low Gate Charge for fast switching
- Low Thermal resistance

**Application**

- MB/VGA Vcore
- SMPS 2<sup>nd</sup> Synchronous Rectifier
- BLDC Motor driver

**Product Summary**

 $V_{DS}=30V$ 
 $R_{DS(ON)}=9.4m\Omega$ 
 $I_D=35A$ 

**DFN3 x 3**
**Ordering Information:**

Part NO.	ZM094N03M
Marking	094N03
Packing Information	REEL TAPE
Basic ordering unit (pcs)	5000

**Absolute Maximum Ratings (T<sub>C</sub> =25°C)**

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D@TC=25^\circ C$	35	A
	$I_D@TC=75^\circ C$	26	A
	$I_D@TC=100^\circ C$	22	A
	$I_D@T_A=25^\circ C$	10.3	A
	$I_D@T_A=70^\circ C$	8.2	A
Pulsed Drain Current <sup>①</sup>	$I_{DM}$	70	A
Total Power Dissipation <sup>②</sup>	$P_D@TC=25^\circ C$	40	W
Total Power Dissipation	$P_D@T_A=25^\circ C$	2.0	W
Operating Junction Temperature	$T_J$	-55 to 150	°C
Storage Temperature	$T_{STG}$	-55 to 150	°C
Single Pulse Avalanche Energy	$E_{AS}$	30	mJ

**●Thermal resistance**

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case <sup>②</sup>	R <sub>thJC</sub>	-	-	3.1	° C/W
Thermal resistance, junction - ambient	R <sub>thJA</sub>	-	-	60	° C/W
Soldering temperature, wave soldering for 10s	T <sub>sold</sub>	-	-	265	° C

**●Electronic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	30			V
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250uA	1.2		2.5	V
Drain-Source Leakage Current	I <sub>DSS</sub>	V <sub>DS</sub> =30V, V <sub>GS</sub> =0V			1.0	uA
Gate- Source Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±12V, V <sub>DS</sub> =0V			±100	nA
Static Drain-source On Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =8A		9.4	12	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =6A		13	18	mΩ
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =10V, I <sub>D</sub> =5A		9		s
Source-drain voltage	V <sub>SD</sub>	I <sub>S</sub> =24A			1.28	V

**●Electronic Characteristics**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	C <sub>iss</sub>	f = 1MHz	-	560	-	pF
Output capacitance	C <sub>oss</sub>		-	81	-	
Reverse transfer capacitance	C <sub>rss</sub>		-	49	-	

**●Gate Charge characteristics(T<sub>a</sub> = 25°C)**

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Gate Resistance	R <sub>g</sub>	f = 1MHz		2		Ω
Total gate charge	Q <sub>g</sub>	V <sub>DD</sub> =25V I <sub>D</sub> = 8A V <sub>GS</sub> = 10V	-	10	-	nC
Gate - Source charge	Q <sub>gs</sub>		-	1.6	-	
Gate - Drain charge	Q <sub>gd</sub>		-	2.8	-	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DS</sub> =25V		5		ns

Turn-on Rise time Rise Time	$t_r$	$I_D = 8A$ $V_{GS}=10V$ $R_{GEN}=3\Omega$	3	ns
Turn-off Delay Time	$t_{d(off)}$		18	ns
Turn-off Fall Time	$t_f$		3	ns

Note: ① Pulse Test : Pulse width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$  ;

② Device mounted on FR-4 substrate PC board, 2oz copper, with thermal bias to bottom layer 1inch square copper plate;

Fig.1 Gate-Charge Characteristics

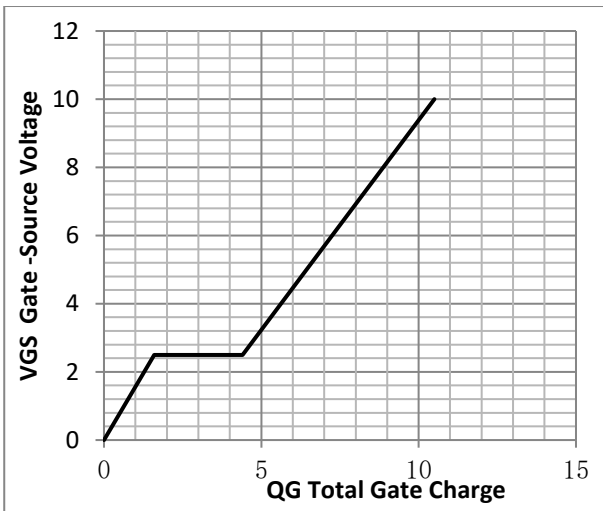


Fig.2 Capacitance Characteristics

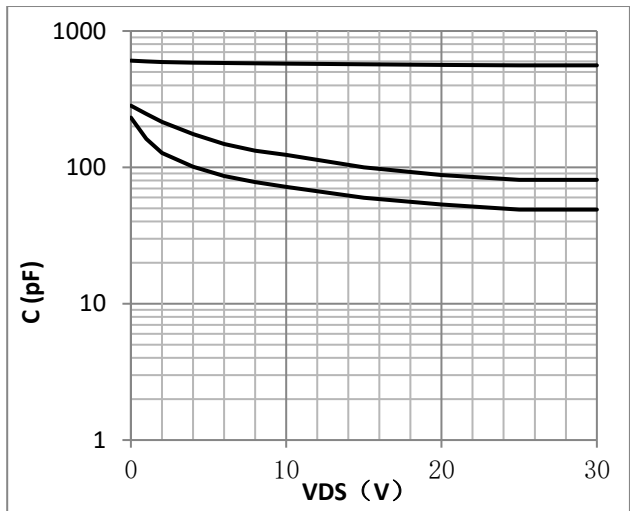


Fig.2 Power Dissipation Derating Curve

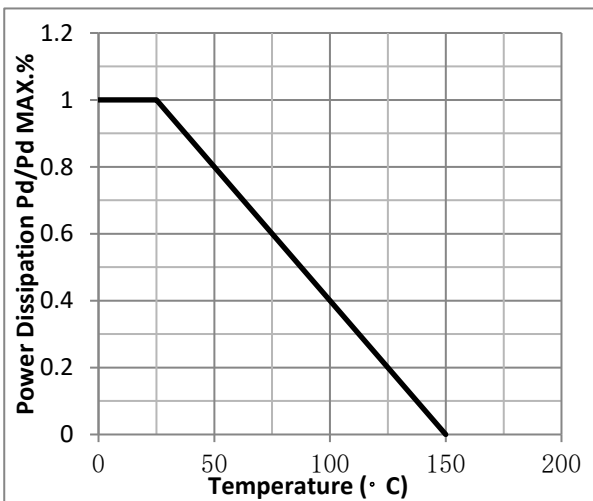


Fig.3 Typical output Characteristics

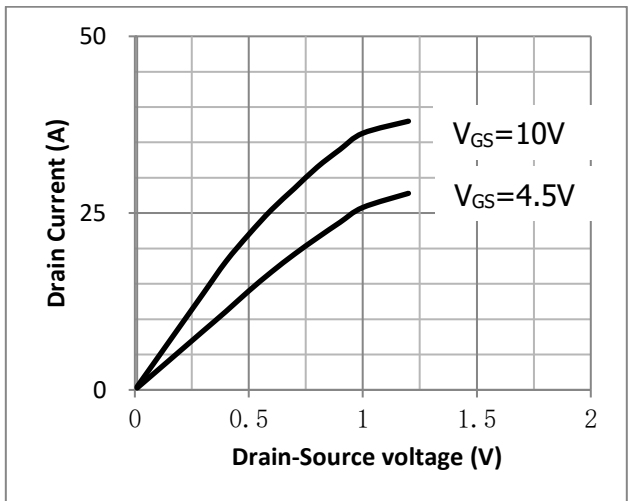


Fig.4 Threshold Voltage V.S Junction Temperature    Fig.5 Resistance V.S Drain Current

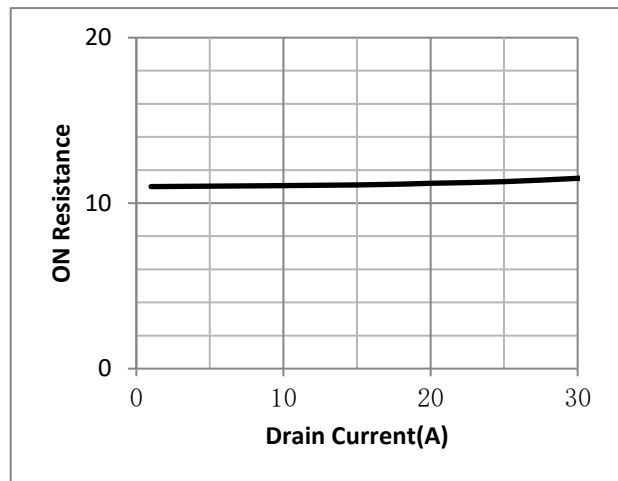
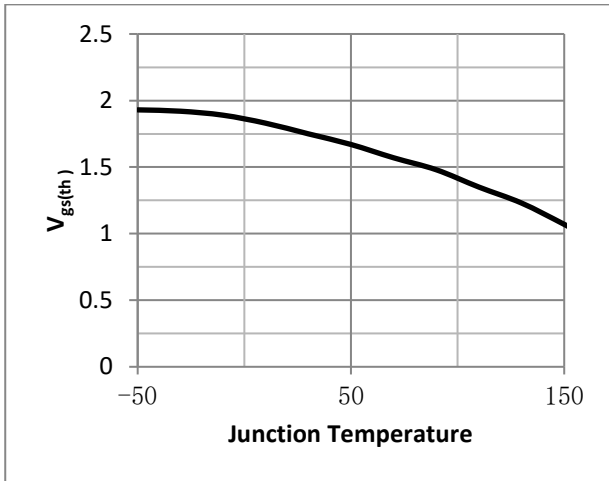


Fig.6 On-Resistance VS Gate Source Voltage

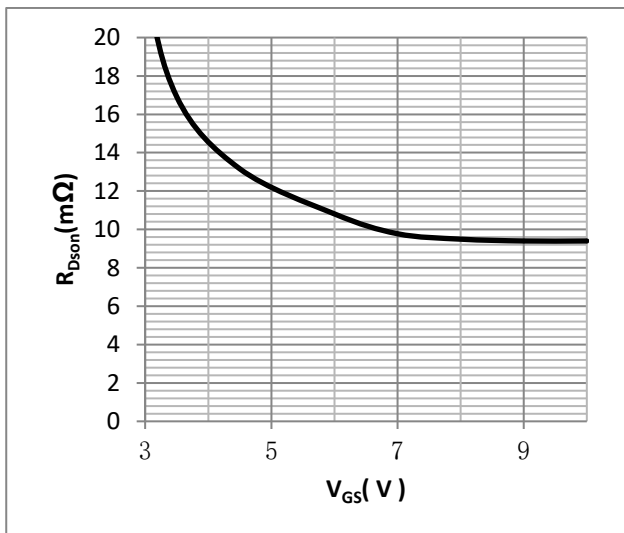


Fig.7 On-Resistance V.S Junction Temperature

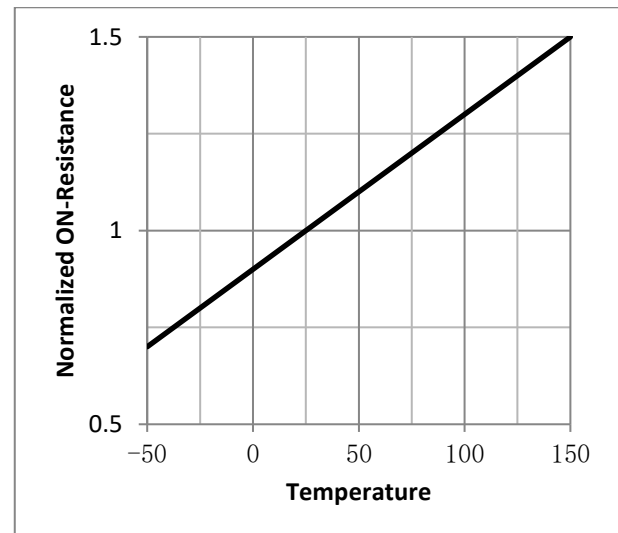


Fig.8 Maximum Forward Biased Safe Operating Area    Fig.9 ID-Junction Temperature

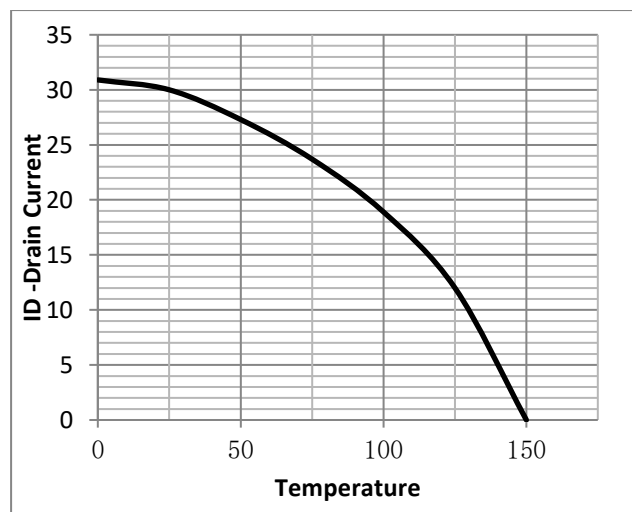
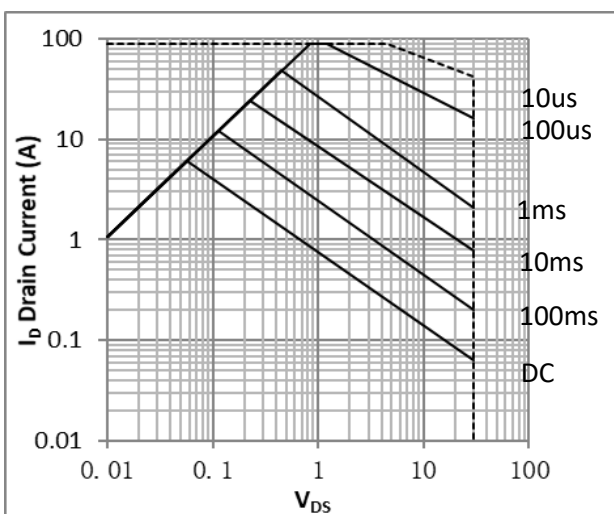


Fig.10 Switching Time Measurement Circuit

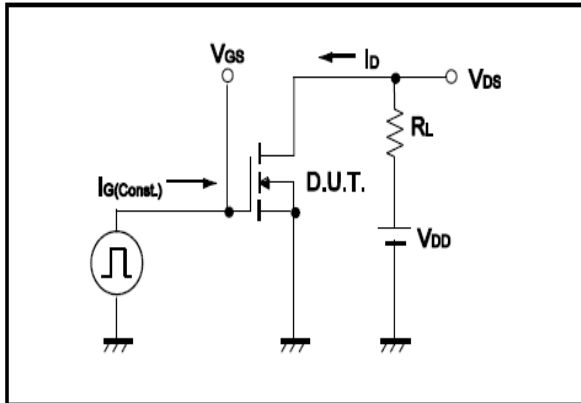


Fig.11 Gate Charge Waveform

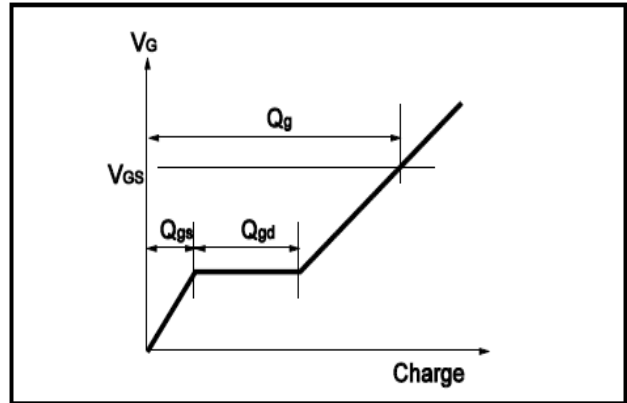


Fig.12 Switching Time Measurement Circuit

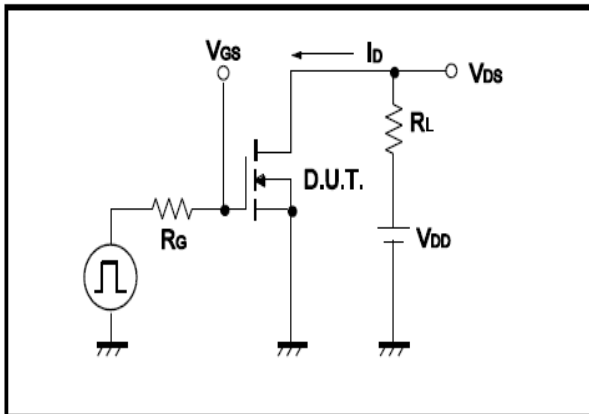


Fig.13 Gate Charge Waveform

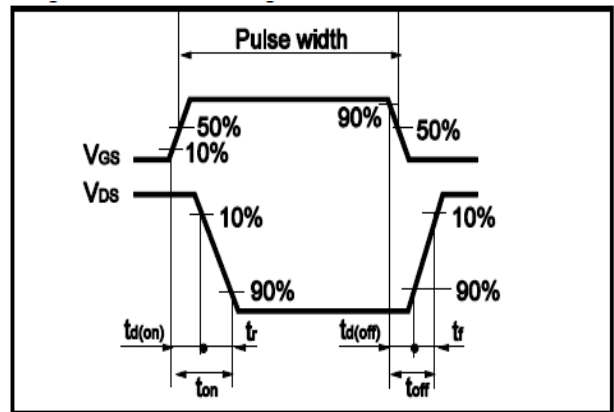


Fig.14 Avalanche Measurement Circuit

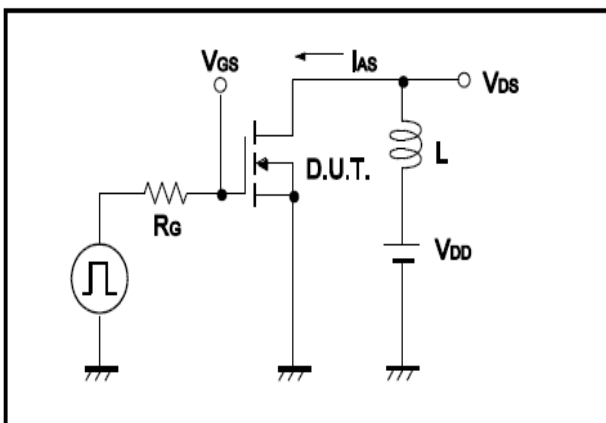
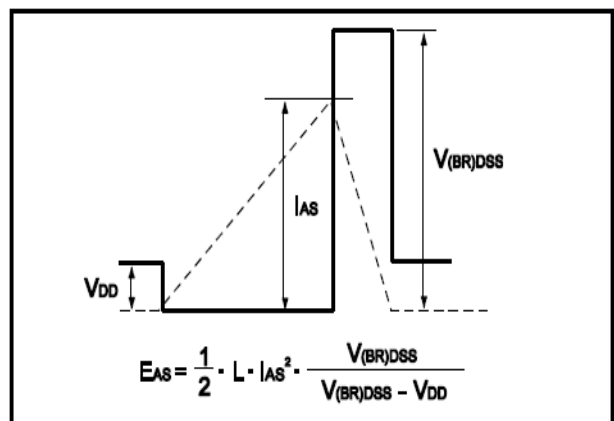


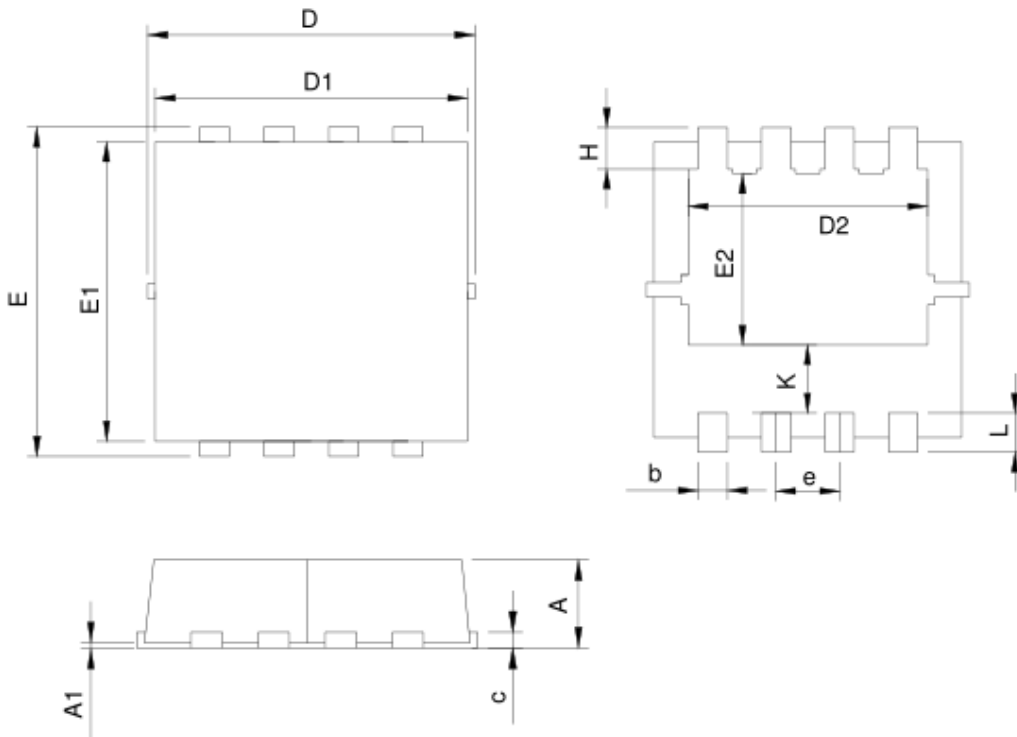
Fig.15 Avalanche Waveform





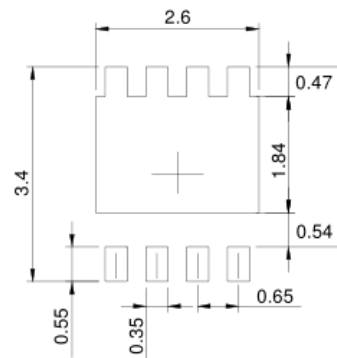
•Dimensions(DFN3x3)

Unit: mm



SYMBOL	DFN3.3x3.3-8			
	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	0.70	1.00	0.028	0.039
A1	0.00	0.05	0.000	0.002
b	0.25	0.35	0.010	0.014
c	0.14	0.20	0.006	0.008
D	3.10	3.50	0.122	0.138
D1	3.05	3.25	0.120	0.128
D2	2.35	2.55	0.093	0.100
E	3.10	3.50	0.122	0.138
E1	2.90	3.10	0.114	0.122
E2	1.64	1.84	0.065	0.072
e	0.65 BSC		0.026 BSC	
H	0.32	0.52	0.013	0.020
K	0.59	0.79	0.023	0.031
L	0.25	0.55	0.010	0.022

RECOMMENDED LAND PATTERN



UNIT: mm