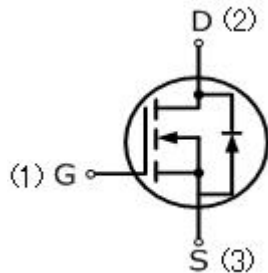


20N50MF

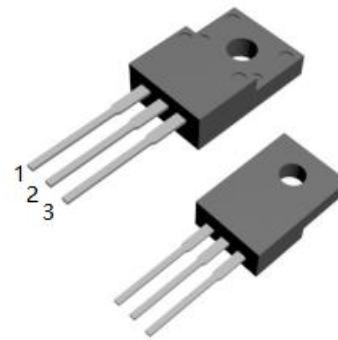
20 Amps,500 Volts N-CHANNEL Power MOSFET

FEATURE

- 20A,500V, $R_{DS(ON)MAX}=0.32\ \Omega$ @ $V_{GS}=10V/10A$
- Low gate charge
- Low C_{iss}
- Fast switching
- 100% avalanche tested
- Improved dv/dt capability



TO-220MF-3L



Absolute Maximum Ratings ($T_C=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	20N50MF	UNIT
Drain-Source Voltage	V_{DSS}	500	V
Gate-Source Voltage	V_{GS}	± 30	
Continuous Drain Current	I_D	20	A
Pulsed Drain Current(Note1)	I_{DM}	80	
Single Pulse Avalanche Energy (Note 2)	E_{AS}	675	mJ
Reverse Diode dV/dt (Note 3)	dv/dt	5	V/ns
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55to+150	$^\circ\text{C}$
Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	T_L	260	$^\circ\text{C}$

Parameter	Symbol	20N50MF	Units
Thermal resistance , Channel to Case	$R_{th(ch-c)}$	2.78	$^\circ\text{C}/\text{W}$
Maximum Power Dissipation	$T_C=25^\circ\text{C}$ P_D	45	W

Electrical Characteristics ($T_c=25^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu\text{A}$	500	—	—	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=500V, V_{GS}=0V$	—	—	1	μA
Gate-Body Leakage Current, Forward	I_{GSSF}	$V_{GS}=30V, V_{DS}=0V$	—	—	100	nA
Gate-Body Leakage Current, Reverse	I_{GSSR}	$V_{GS}=-30V, V_{DS}=0V$	—	—	-100	nA
On Characteristics						
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	2.0	—	4.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$	—	0.256	0.32	Ω
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS}=25V, V_{GS}=0V,$ $f=1.0\text{MHz}$	—	3235	—	pF
Output Capacitance	C_{oss}		—	243	—	pF
Reverse Transfer Capacitance	C_{rss}		—	61	—	pF
Switching Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=250V, I_D=18A,$ $R_G=10\Omega$	—	27.8	—	ns
Turn-On Rise Time	t_r		—	5.8	—	ns
Turn-Off Delay Time	$t_{d(off)}$		—	77.4	—	ns
Turn-Off Fall Time	t_f		—	8.4	—	ns
Total Gate Charge	Q_g	$V_{DS}=400V, I_D=18A,$ $V_{GS}=10V$	—	52	—	nC
Gate-Source Charge	Q_{gs}		—	13	—	nC
Gate-Drain Charge	Q_{gd}		—	19	—	nC
Drain-Source Body Diode Characteristics and Maximum Ratings						
Diode Forward Voltage	V_{SD}	$I_S=1A, V_{GS}=0V$	—	—	1.2	V
Reverse Recovery Time	t_{rr}	$V_{DS}=30V, I_S=1A,$ $dI_F/dt=100A/\mu\text{s}, (\text{Note3})$	—	553	—	ns
Reverse Recovery Charge	Q_{rr}		—	6.0	—	μC

Notes

1. Repetitive Rating: pulse width limited by maximum junction temperature.
2. $V_{DD}=100V, L=10\text{mH}, R_g=25\Omega$, starting $T_J=25^\circ\text{C}$.
3. Pulse width $\leq 300\mu\text{s}$; duty cycle $\leq 2\%$.

RATING AND CHARACTERISTIC CURVES



Peak Diode Recovery dv/dt Test Circuit



Peak Diode Recovery dv/dt Waveforms



Switching Test Circuit



Switching Waveforms



Gate Charge Test Circuit



Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms

RATING AND CHARACTERISTIC CURVES

Figure.1 Typical Output Characteristics

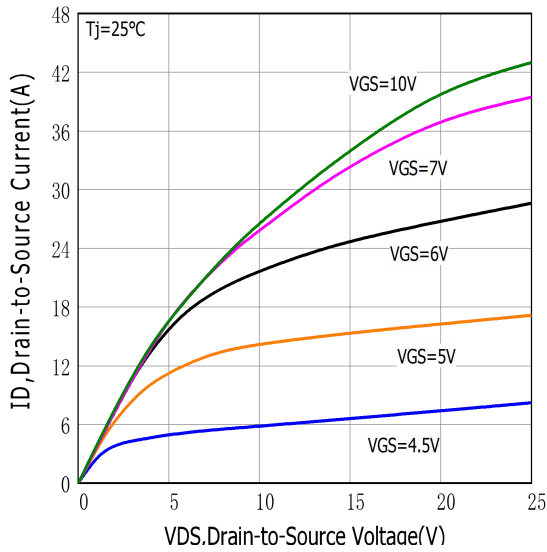


Figure.2 Typical Gate Charge vs Gate to Source Voltage

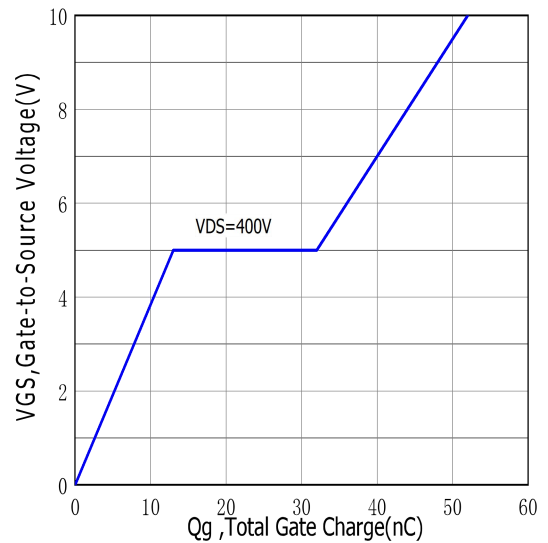


Figure.3 Typical Body Diode Transfer Characteristics

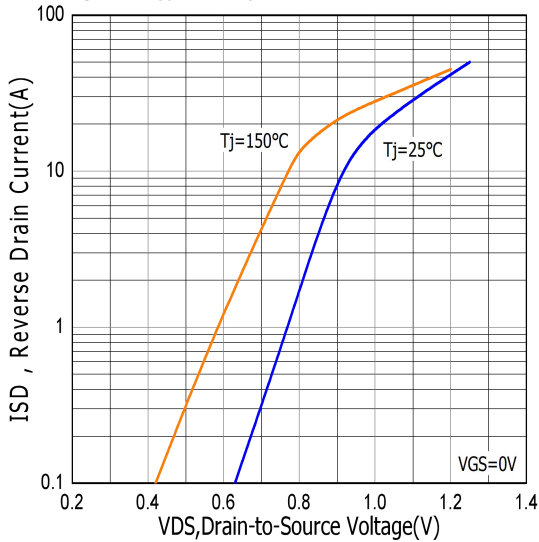


Figure.4 Typical Capacitance vs Drain to Source Voltage

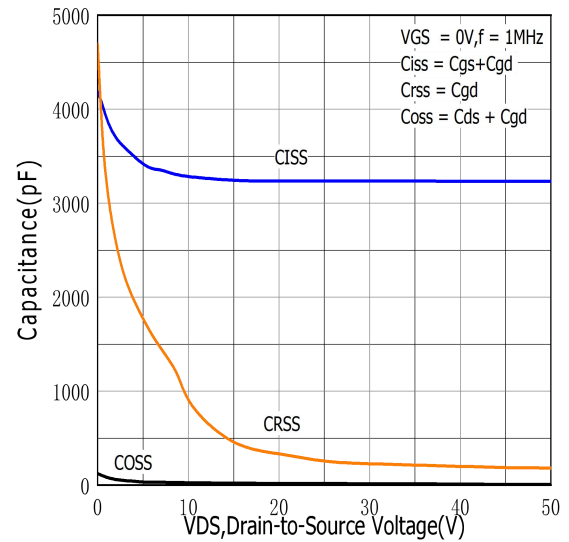


Figure.5 Typical Breakdown Voltage vs Junction Temperature

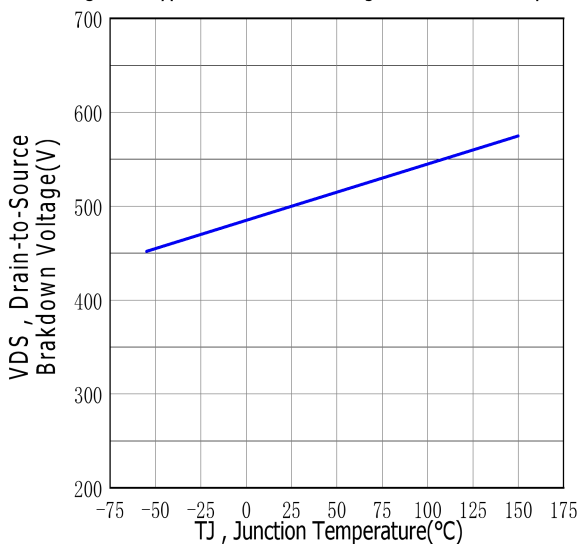


Figure.6 Typical Drain to Source on Resistance vs Junction Temperature

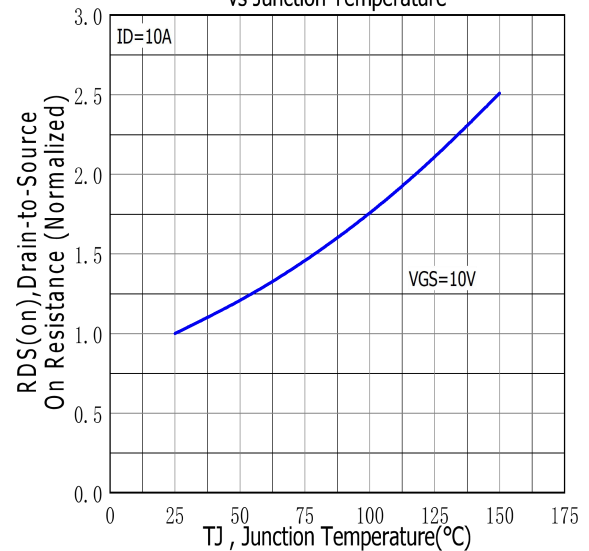


Figure.7 Maximum Forward Bias Safe Operating Area

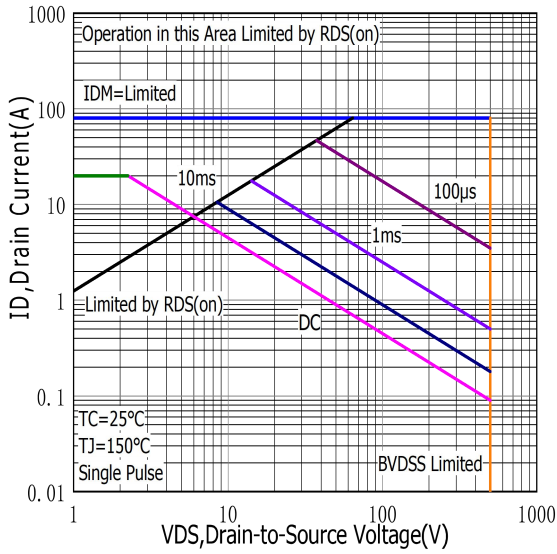


Figure.8 Typical Drain to Source ON Resistance vs Drain Current

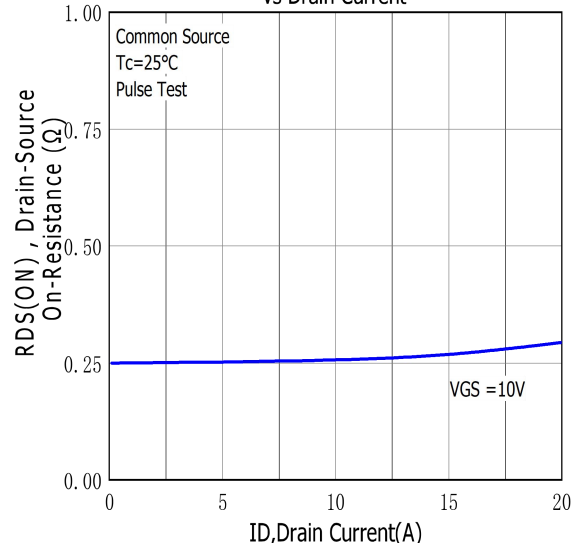


Figure.9 Maximum EAS vs Channel Temperature

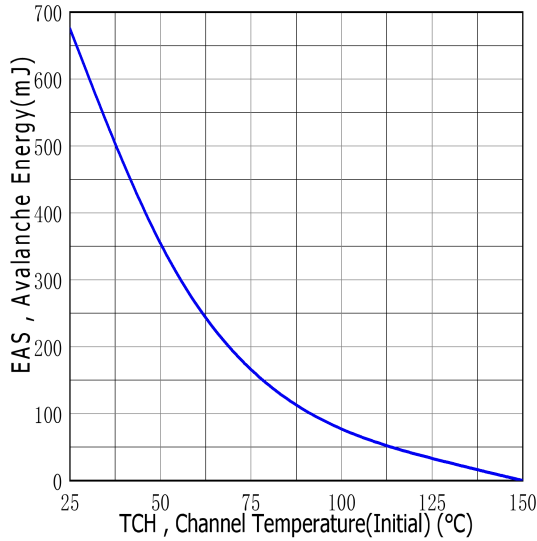


Figure.10 Typical Threshold Voltage vs Case Temperature

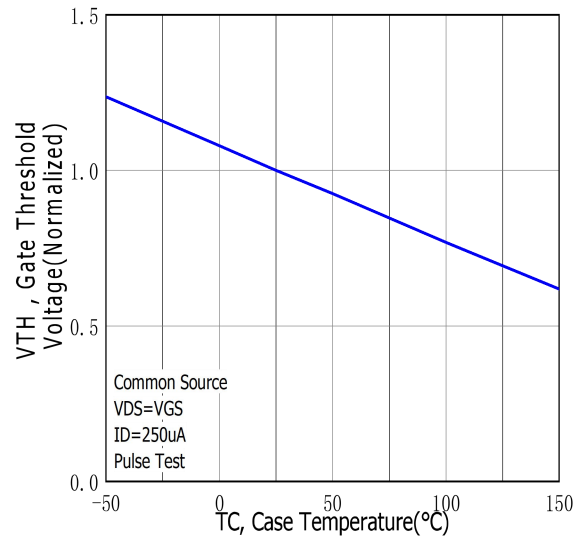


Figure.11 Maximum Effective Thermal Impedance, Junction to Case

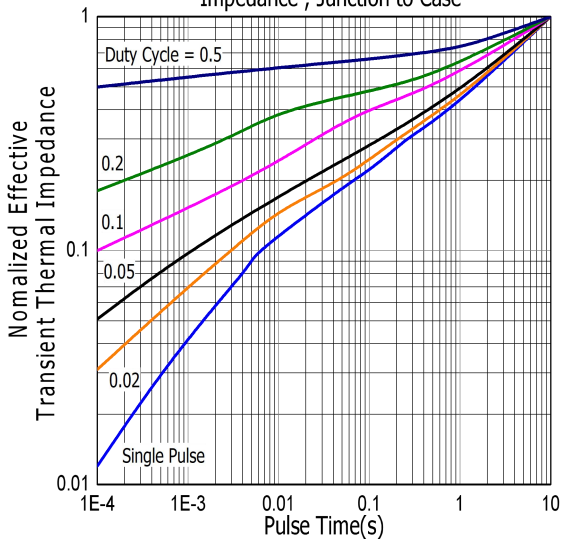
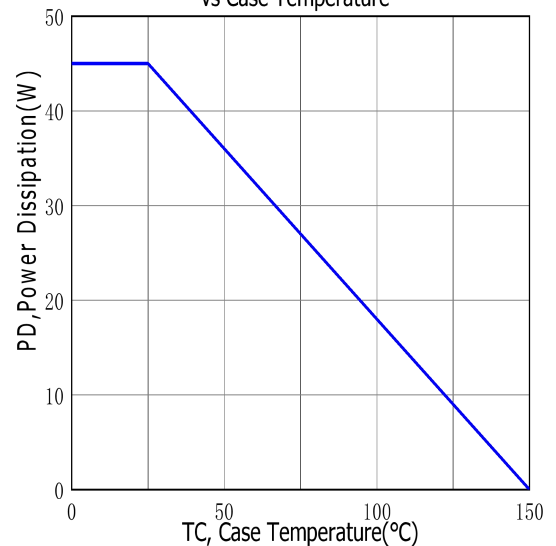
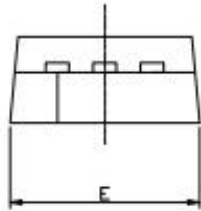
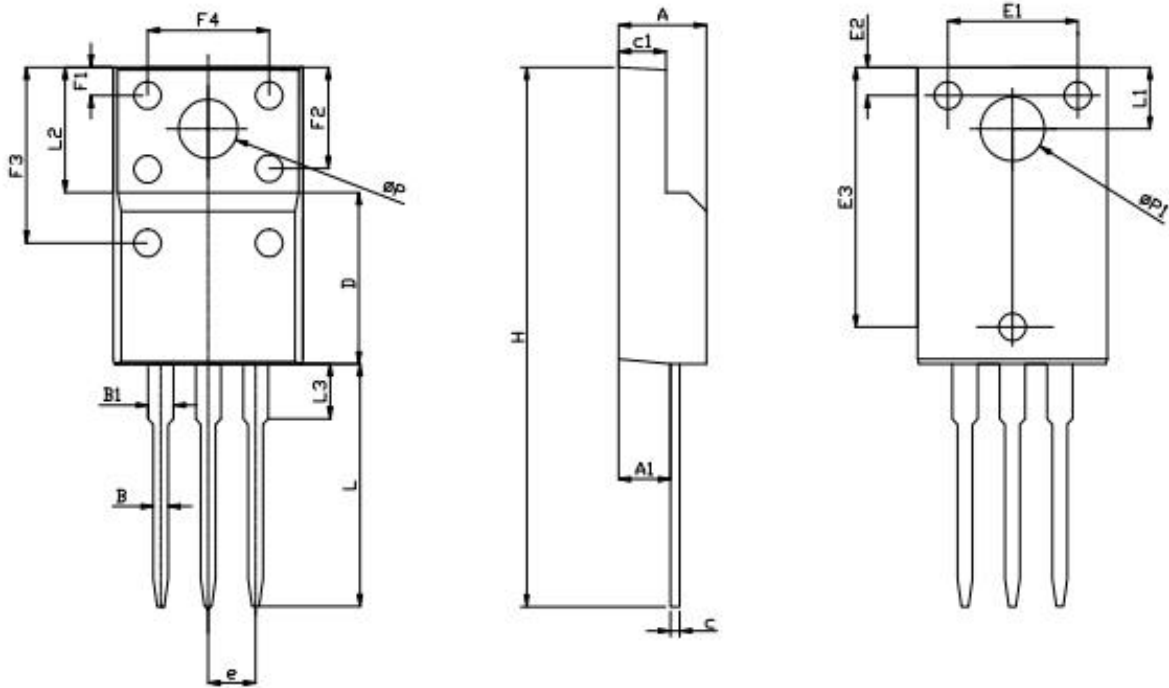


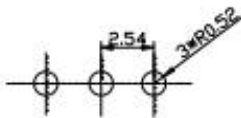
Figure.12 Maximum Power Dissipation vs Case Temperature



TO-220MF-3L PACKAGE OUTLINE



RECOMMENDED LAND PATTERN

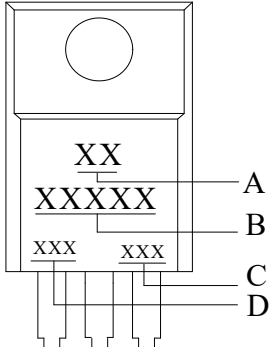


UNIT: mm

	MIN	NOM	MAX
A	4.50	4.70	4.90
A1	2.63	2.76	2.89
B	0.75	0.80	0.90
B1	1.15	1.35	1.55
c	0.40	0.50	0.60
c1	2.34	2.54	2.74
D	8.87	9.17	9.47
e	-	2.54REF	-
E	9.86	10.16	10.46
E1	6.86	6.96	7.06
E2	1.40	1.50	1.60
E3	13.80	13.90	14.00
F1	1.40	1.50	1.60
F2	5.15	5.40	5.65
F3	9.10	9.40	9.70
F4	6.70	7.00	7.30
H	28.50	29.00	29.50
L	12.58	12.98	13.38
L1	3.15	3.30	3.45
L2	-	6.70REF	-
L3	2.63	2.93	3.23
ΦP	2.90	3.18	3.48
ΦP1	3.15	3.45	3.75

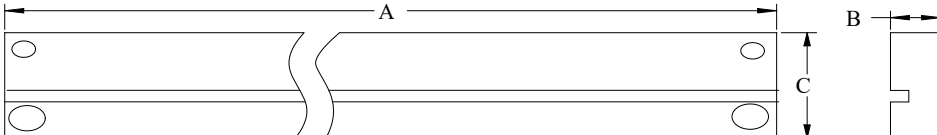
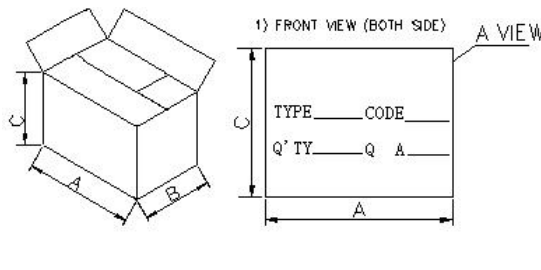
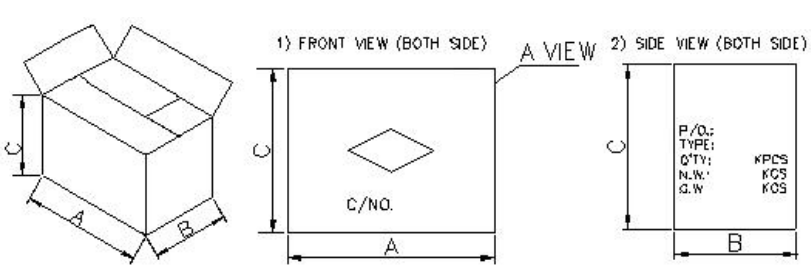
Marking and packaging illustration

1、 Marking



SYMBOL	Explanation
A	Trademark
B	Product Name
C	Date Code
D	Product Information

2、 Packaging

	
Tube	
	
Inside Box	Outside Box

类别	A (mm)	B (mm)	C (mm)
TO-220 Tube(50EA per tube)	530±5	7±0.8	33±1
TO-220 Inside Box (1K per box)	542±5	82±2	78±1
TO-220 outside Box (6K per box)	555±5	285±5	245±5

测试报告

		日期	2021-5-18
		客户	
		批号	
产品名称	20N50MF	记录	王航
产品商标	PY	审核	王强

电参数测试

测试条件 合格标准	ID=250uA VGS=0V	VGS=VDS ID=250uA	VDS=500V VGS=0V	VGS=±30V VDS=0V		ID=10A VGS=10V	VGS=0V IS=20A	备注
	BVDSS≥500V	2.0V≤VTH≤4.0V	IDSS≤1000nA	IGSS ≤100nA		RDS(ON)≤300mΩ	VSD≤1.5V	
1	568.9	3.127	35.9	1.3	-6.3	215.4	0.798	
2	562.3	3.124	40.5	1.5	-4.0	219.1	0.790	
3	564.5	3.119	38.3	1.3	-6.9	220.7	0.791	
4	563.5	3.130	41.2	1.0	-2.6	221.1	0.790	
5	565.2	3.119	39.9	2.1	-6.7	221.6	0.790	
6	565.6	3.112	39.4	0.4	-6.7	221.8	0.791	
7	568.7	3.164	40.2	0.8	-2.8	223.0	0.789	
8	561.4	3.153	38.7	2.0	-6.5	216.7	0.790	
9	564.2	3.169	39.0	1.8	-6.4	220.1	0.789	
10	569.9	3.094	40.0	2.5	-6.6	225.9	0.791	
11	569.8	3.099	41.0	0.7	-3.9	226.1	0.790	
12	568.7	3.081	38.4	0.9	-6.3	225.2	0.790	
13	566.4	3.058	40.3	2.0	-5.1	223.7	0.791	
14	568.5	3.050	39.0	2.1	-6.5	225.2	0.790	
15	569.9	3.090	39.7	2.1	-3.6	226.5	0.790	
16	565.9	3.138	38.9	1.9	-4.5	223.0	0.791	
17	565.0	3.149	35.9	2.5	-5.5	222.1	0.791	
18	566.7	3.131	38.1	1.4	-3.3	223.6	0.791	
19	565.7	3.137	40.1	1.7	-5.4	223.9	0.791	
20	566.7	3.128	38.0	0.7	-6.6	223.9	0.791	
21	564.3	3.106	37.9	1.9	-3.4	219.9	0.789	
22	567.4	3.137	39.7	1.0	-5.9	224.1	0.790	
23	568.6	3.126	38.3	2.1	-5.3	223.2	0.790	
24	569.4	3.147	38.0	1.8	-2.1	225.2	0.791	
25	568.0	3.157	38.2	1.9	-5.7	224.2	0.791	
26	565.5	3.143	38.7	0.6	-3.3	223.5	0.790	
27	566.3	3.128	39.7	0.4	-3.8	224.5	0.790	
28	569.9	3.137	39.0	0.9	-6.8	224.5	0.790	
29	569.5	3.138	41.1	1.0	-3.8	225.0	0.790	
30	567.2	3.087	38.3	1.7	-6.9	222.8	0.790	
31								
32								
33								
34								
35								
min	561.4	3.05	35.9	0.4	-6.9	215.4	0.789	
max	569.9	3.169	41.2	2.5	-2.1	226.5	0.798	
avg	566.8	3.123	39.0467	1.47	-5.11	222.850	0.791	

可靠性认证要求

序号	试验项目	参考标准	试验条件/方法	每批次样本	Duration/试验判据
1	高压蒸煮	JESD22-102	121±2°C/15PSI/100%RH/96 (-0, +5) h	22	满足参数规格, 0收1退
2	温度冲击	JESD22-A106	TA= -55°C, TB = 150°C/高温或低温端暴露时间t1=30min/50次	22	满足参数规格, 0收1退
3	耐焊接热	JESD22-B106	贴片270 (-0, +5°C) /10±1s	22	满足参数规格, 0收1退
4	高温贮存	JESD22-A103	TA=150°C/168h	22	满足参数规格, 0收1退
5	低温贮存	JESD22-A103	TA=-55°C/168h	22	满足参数规格, 0收1退
6	高温反偏	JESD22-A108	TA/80%VRRM/168h	22	满足参数规格, 0收1退
7	高温高湿	JESD22-A101	85±2°C/85±5%RH/168h	22	满足参数规格, 0收1退
8	可焊锡	JESD22-B102	→可焊性测试245±5°C, 5±0.5s	22	50倍显微镜观察 上锡面积≥95%
9	温度循环	JESD22-A104	TA=-65°C to +150°C 10min 变化速率10°C/min 10times	22	满足参数规格, 0收1退

CHONGQING PINGWEI ENTERPRISE CO.,LTD

Chemical Composition Of Diode(创维-TO-220MF, 20N50MF)

Weight: 2156.840 mg/pcs

2021/6/7

Make up of material	Chemical Composition	CAS NO.	Averager (weight%)	weight of part (%)	Substance weight (mg)	Name of supplier
Lead Wire	P	7723-14-0	0.03	0.0224%	0.4839000	Sichuan jinwan electronic co., LTD
	Fe	7439-89-6	0.1	0.0748%	1.6130000	
	Cu	7440-50-8	99.87	74.6881%	1610.9031000	
Chip	Silicon (Si)	7440-21-3	95.88327	0.1987%	4.28598217	1.Xiamen XYDFAB Integrated Circuit Co.,Ltd 2.Perfet Intelligent Power Semiconductor Co.,Ltd
	Aluminum (Al)	7429-90-5	1.99062	0.0041%	0.08898071	
	Titanium (Ti)	7440-32-6	0.08338	0.0002%	0.00372709	
	(Ni)	7440-02-0	0.11464	0.0002%	0.00512441	
	Silver (Ag)	7440-22-4	1.92809	0.0040%	0.08618562	
Soldering	Lead(Pb)	7439-92-1	95.5	0.1466%	3.1610500	1.WUXI LIHONG ELECTRONI MATERIALS CO;LTD 2.SHANGHAI CHENXIN ELECTRONIC MATERIAL CO..LTD
	Tin(Sn)	7440-31-5	2	0.0031%	0.0662000	
	Silver(Ag)	7440-22-4	2.5	0.0038%	0.0827500	
Aluminum wire	Al	7429-90-5	99.984	1.4969%	32.2848336	1.TANAKA ELECTRONICS SINGAPORE PTE LTD 2.HERAEUS (ZHAOYUAN) PRECIOUS METAL MATERIALS CO.,LTD
	other	NA	0.016	0.0002%	0.0051664	
Solder plating	Tin(Sn)	7440-31-5	99.99	1.57390%	33.9466050	YUNNAN TIN CO.,LTD
	Lead(Pb)	7439-92-1	0.0035	0.00006%	0.0011883	
	Iron(Fe)	7439-89-6	0.0045	0.00007%	0.0015278	
	Copper(Cu)	7440-50-8	0.002	0.00003%	0.0006790	
Encapsulation	Polymers of formaldehyde with (chloromethyl) ethylene oxide and 2-methylphenol	29690-82-2	15	3.2674%	70.4730000	1.CHANG CHUN SB (CHANG SHU)CO.,LTD 2.Hysol Huawei Electronics Co., Ltd
	Phenolic Resin	9003-35-4	5.5	1.1981%	25.8401000	
	Silica	60676-86-0	73.5	16.0104%	345.3177000	
	Carbon black	1333-86-4	0.5	0.1089%	2.3491000	
	Metal hydroxide	NA	5.5	1.1981%	25.8401000	

Note : Pb used in high melting temperature type solders is exempted from RoHS.