

BRCS020N04RA

Rev.C Mar.-2023

/ Descriptions

TO-220 N
N-CHANNEL MOSFET in a TO-220 Plastic Package.

/ Features

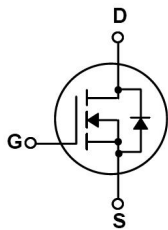
Ultra Low On-Resistance, fast switching, HF Product.

/ Applications

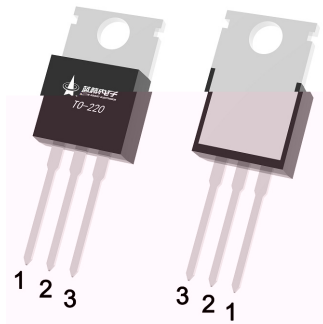
PFC

These devices are well suited for high efficient switched mode power supplies Active power factor correction, electronic lamp ballast based on half bridge topology.

/ Equivalent Circuit



/ Pinning



PIN1 G PIN 2 4 D PIN 3 S

/ Marking

See Marking Instructions.

/ Absolute Maximum Ratings($T_a=25^\circ\text{C}$)

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V _{DSS}	40	V
Drain Current		I _D (T _C =25 °C)	220	A
Pulsed Drain Current		I _{DM}	800	A
Gate-Source Voltage		V _{GS}	±20	V
Single Pulsed Avalanche Energy L=0.5mH		E _{AS}	482	mJ
Avalanche Current		I _{AS}	35	A
Total Power Dissipation		P _D (T _C =25 °C)	187	W
Junction and Storage Temperature Range		T _J ,T _{STG}	-55 to 150	
Thermal Resistance-Junction to Ambient	t ≤ 10s	R _{θJA}	15	/W
	Steady-State		60	
Thermal Resistance-Junction to Case	Steady-State	R _{θJC}	0.67	

/ Electrical Characteristics($T_a=25^\circ\text{C}$)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DS}	$V_{GS}=0\text{V}$ $I_D=250\mu\text{A}$	40	44		V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=40\text{V}$ $V_{GS}=0\text{V}$			1	μA
Gate-Body Leakage Current Forward	I_{GSS}	$V_{GS}=\pm 20\text{V}$ $V_{DS}=0\text{V}$			± 100	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}$ $I_D=250\mu\text{A}$	1	1.6	3	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}$ $I_D=20\text{A}$		1.6	2	$\text{m}\Omega$
		$V_{GS}=4.5\text{V}$ $I_D=10\text{A}$		2.1	4	
Forward On Voltage	V_{SD}	$V_{GS}=0\text{V}$ $I_S=1\text{A}$			1.2	V
Input Capacitance	C_{iss}	$V_{DS}=25\text{V}$ $V_{GS}=0\text{V}$ $f=1\text{MHz}$		11000		pF
Output Capacitance	C_{oss}			840		
Reverse Transfer Capacitance	C_{rss}			650		

/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Gate resistance	R_g	$f=1\text{MHz}$		1.45		Ω
Total Gate Charge	$Q_g(10\text{V})$	$V_{GS}=10\text{V}$ $V_{DS}=20\text{V}$ $I_D=20\text{A}$		68		nC
Total Gate Charge	$Q_g(4.5\text{V})$			28		
Gate Source Charge	Q_{gs}			16.5		
Gate Drain Charge	Q_{gd}			4.5		
Turn-On Delay Time	$t_{d(on)}$	$V_{GS}=10\text{V}$ $V_{DS}=20\text{V}$ $R_L=1\Omega$ $R_{GEN}=3\Omega$		12.5		ns
Turn-On Rise Time	t_r			9.5		
Turn-Off Delay Time	$t_{d(off)}$			57.5		
Turn-Off Fall Time	t_f			10.5		

Electrical Characteristic Curve

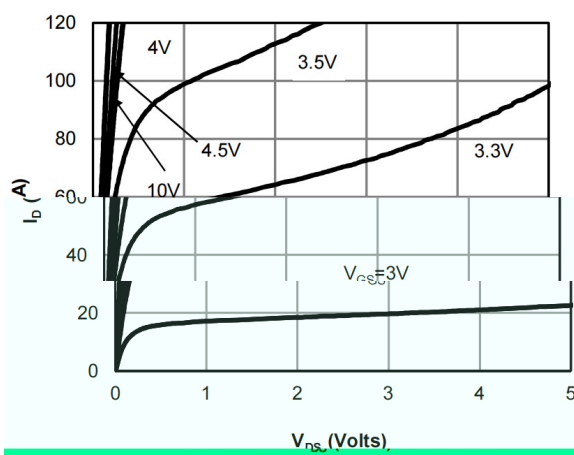


Figure 1: Drain Current vs. Drain-Source Voltage

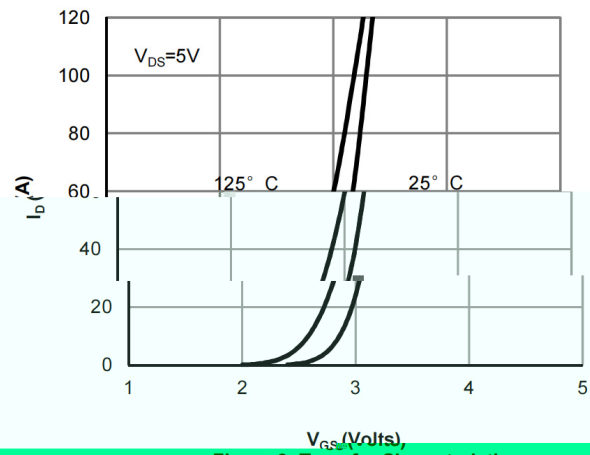


Figure 2: Drain Current vs. Gate-Source Voltage

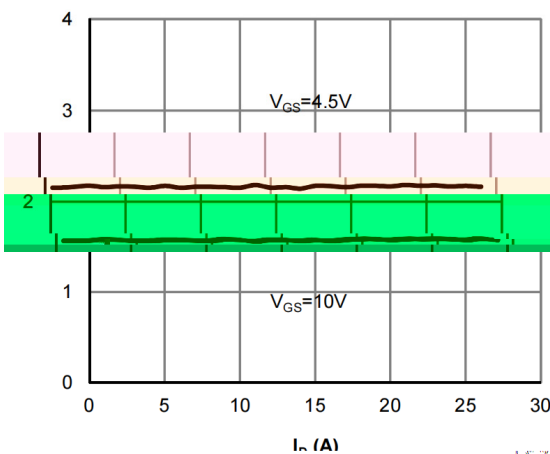


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

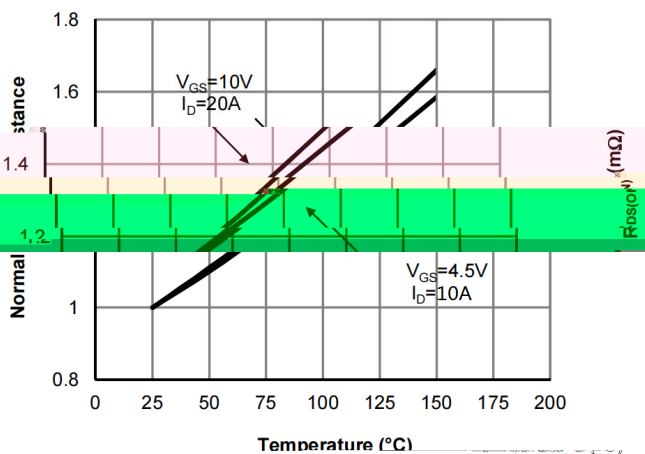


Figure 4: On-Resistance vs. Junction Temperature

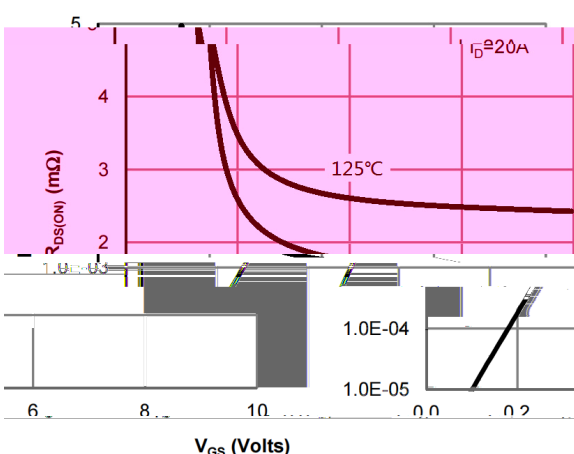


Figure 5: On-Resistance vs. Gate-Source Voltage

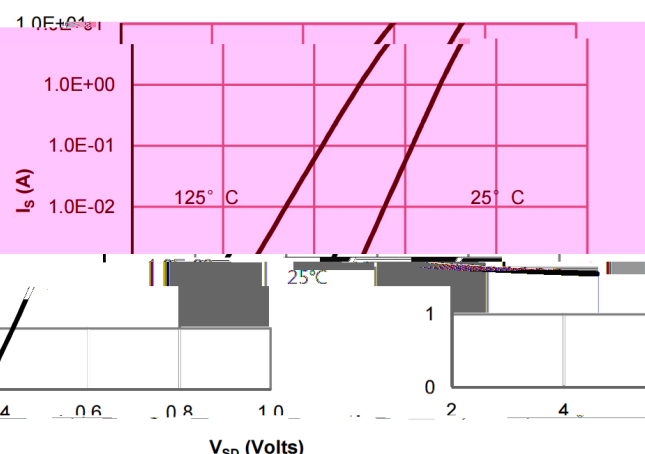
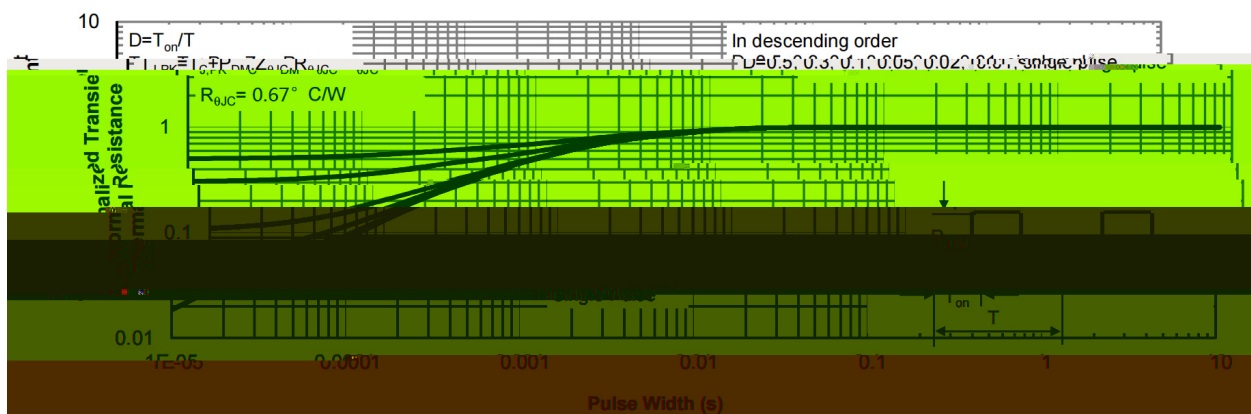
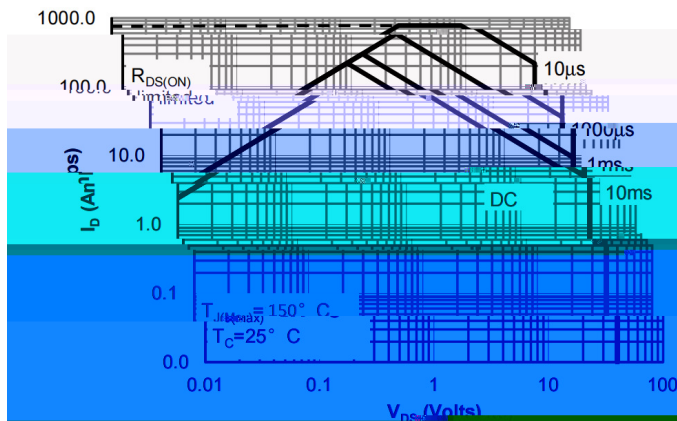
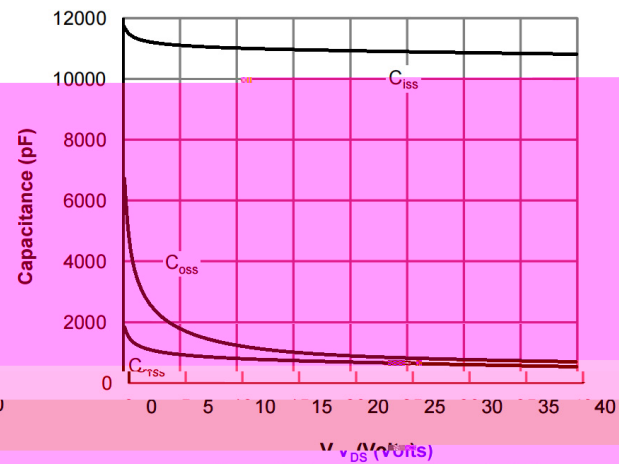
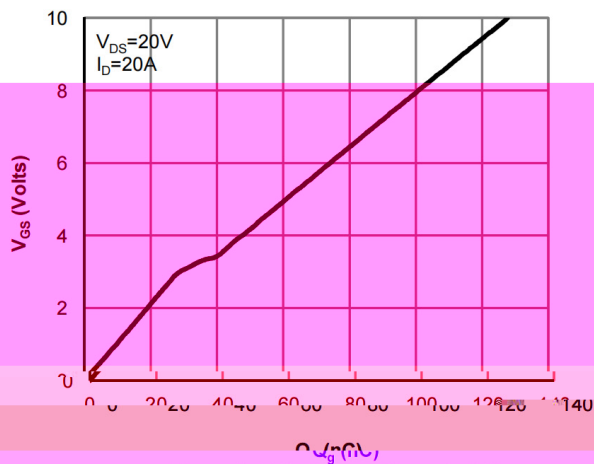


Figure 6: Body Diode Characteristic



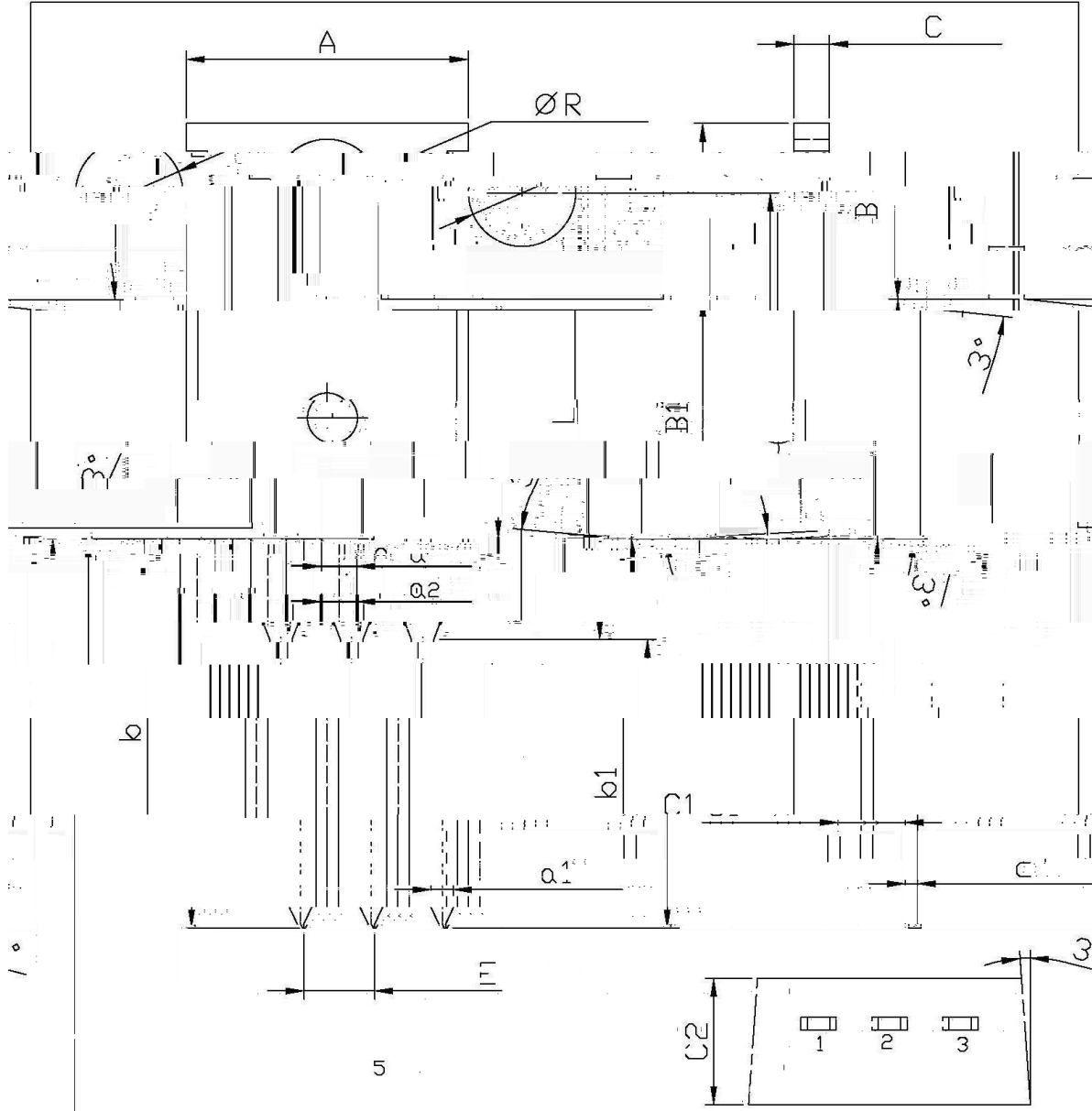
/ Electrical Characteristic Curve



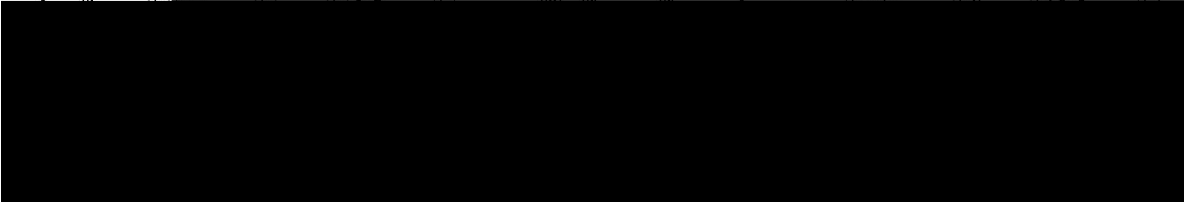
/ Package Dimensions

T□-220

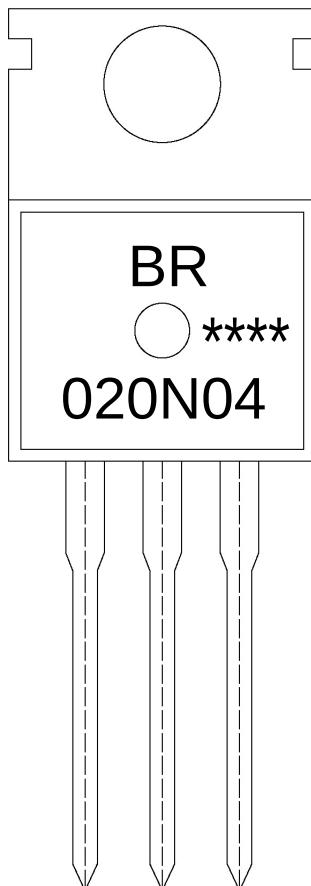
单位: mm



Dimensions In Millimeters				Dimensions In Millimeters			
	Max	Symbol	Min		Max	Symbol	Min
A	14.0	A	9.8	C	10.2	C	11.2
B	6.7	B	3.56	B1	16.1	B1	16.3
C	9.4	C	15.7	C1	2.6	C1	2.7
b	2.6	b	12.6				



/ Marking Instructions



BR

020N04

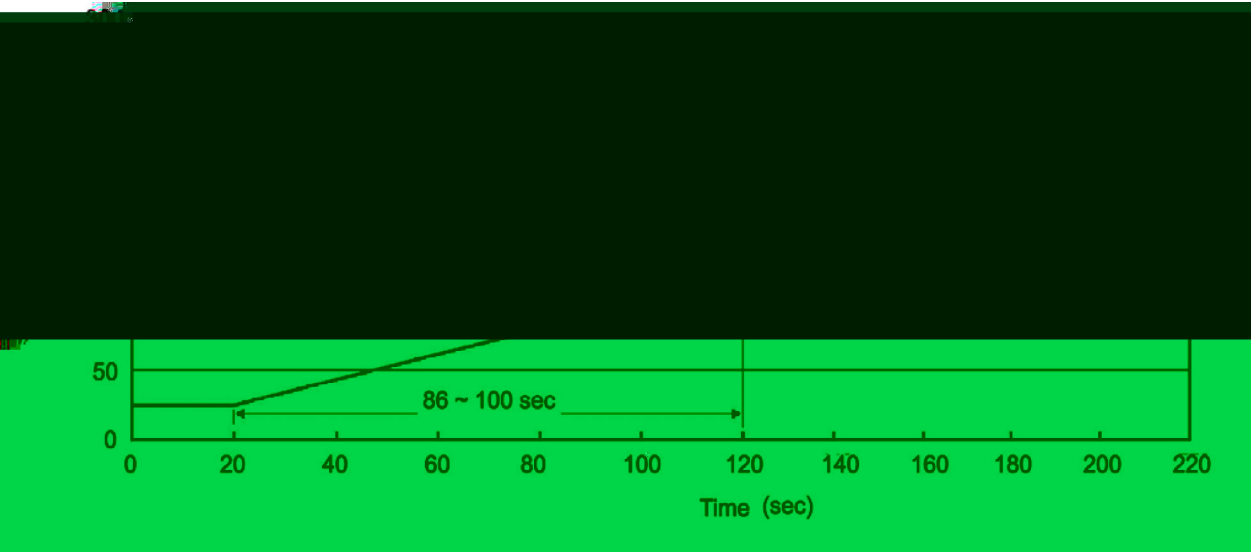
Note:

BR: Company Code

020N04: Product Type

****: Lot No. Code, code change with Lot No

() / Temperature Profile for Dip Soldering(Pb-Free)



Note:

- 1

25 150

60 90sec;

2

255±5

5±0.5sec;

3

2 10 /sec.
- 1.Preheating:25~150 , Time:60~90sec.

2.Peak Temp.:255±5 , Duration:5±0.5sec.

3. Cooling Speed: 2~10 /sec.

/ Resistance to Soldering Heat Test Conditions

270±5 10±1 sec. Temp.:270±5 Time:10±1 sec

/ Packaging SPEC.

/ BULK

Package Type	Units					Dimension (unit mm ³)		
	Units/Bag /	Bags/Inner Box /	Units/Inner Box /	Inner Boxes/Outer Box /	Units/Outer Box /	Bag	Inner Box	Outer Box
TO-220/F	200	10	2,000	5	10,000	135×190	237×172×102	560×245×195

/ TUBE -Q""vT" U`%69 UT ‡V9 `4B'OM 69 UT B dM `9 UuM YB,jF'c\$B fi Bw HH 0'u