/ Descriptions

TO-220 N

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

/ Features

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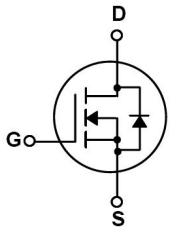
Ultra Low On-Resistance,fast switching, HF Product.

/ Applications

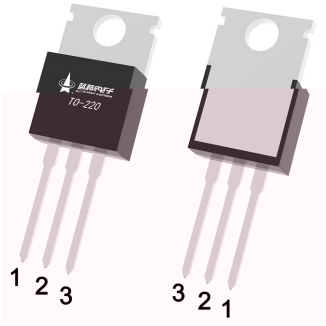
PFC

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(Ta=25)

Parameter		Symbol	Rating	Unit
Drain-Source Voltage		V_{DSS}	40	V
Drain Current		I_D(Tc=25)	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(Tc=25)	187	W
Junction and Storage Temperature Range		T_J,T_{STG}	-55 to 150	
Thermal Resistance-Junction to Ambient	t ≤ 10s	$R_{\theta JA}$	15	/W
	Steady-State		60	
Thermal Resistance-Junction to Case	Steady-State	$R_{\theta JC}$	0.67	

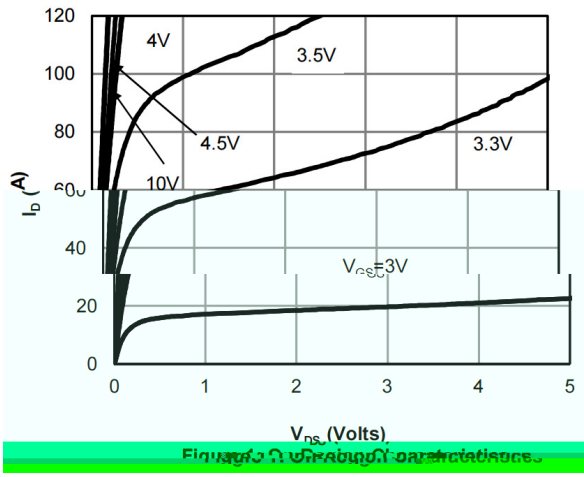
/ Electrical Characteristics(Ta=25)

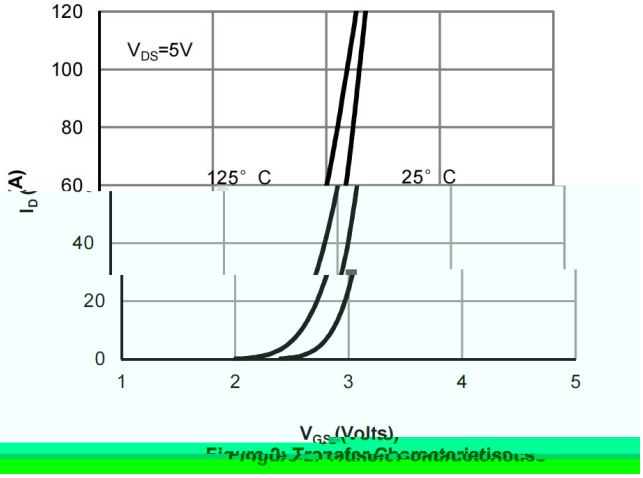
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	40	44		V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V V_{GS}=0V			1	μA
Gate-Body Leakage Current Forward	I_{GSS}	V_{GS}=±20V V_{DS}=0V			±100	nA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}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

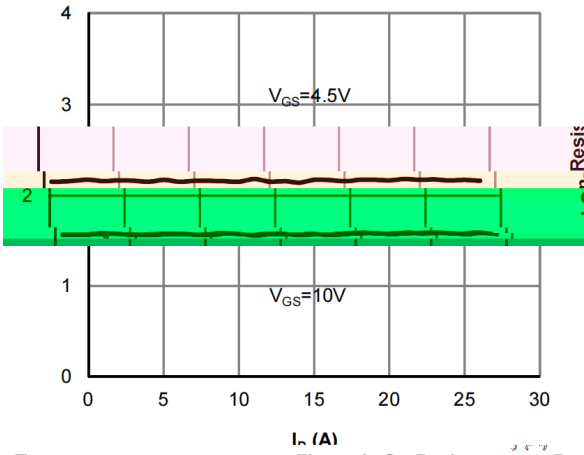
/ Electrical Characteristics(Ta=25)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Gate resistance	R_g	f=1MHz		1.45		Ω
Total Gate Charge	Q_g(10V)	V_{GS}=10V V_{DS}=20V I_D=20A		68		nC
Total Gate Charge	Q_g(4.5V)			28		
Gate Source Charge	Q_{gs}			16.5		
Gate Drain Charge	Q_{gd}			4.5		
Turn-On Delay Time	$t_{d(on)}$	V_{GS}=10V V_{DS}=20V R_L=1Ω R_{GEN}=3Ω		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







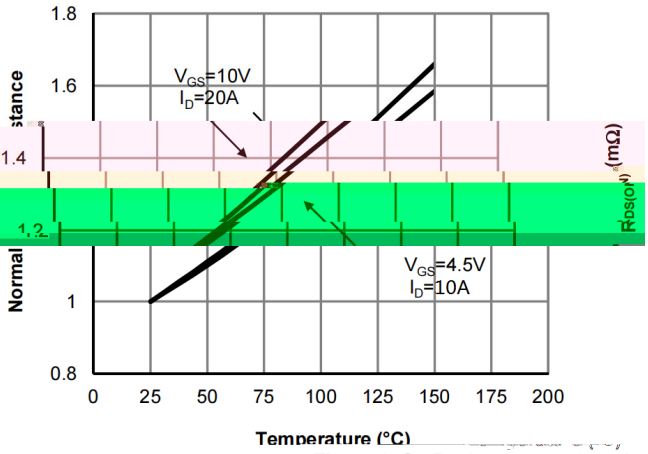
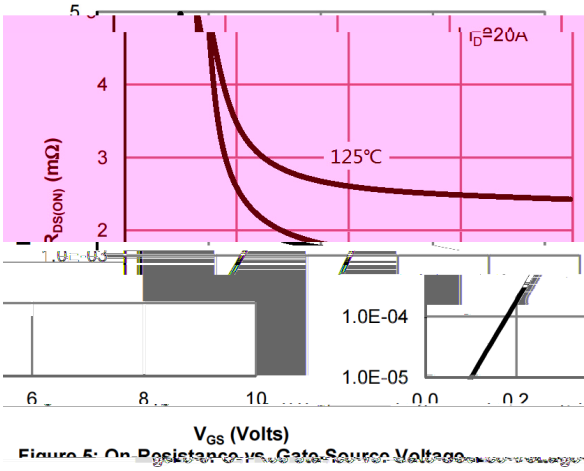


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

Figure 4: On-Resistance vs. Junction Temperature



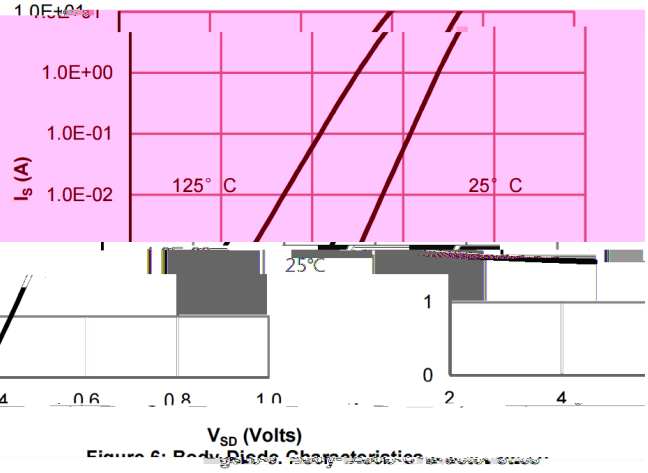


Figure 5: On-Resistance vs. Gate-Source Voltage

Figure 6: Body-Diode Characteristics

/ Electrical Characteristic Curve

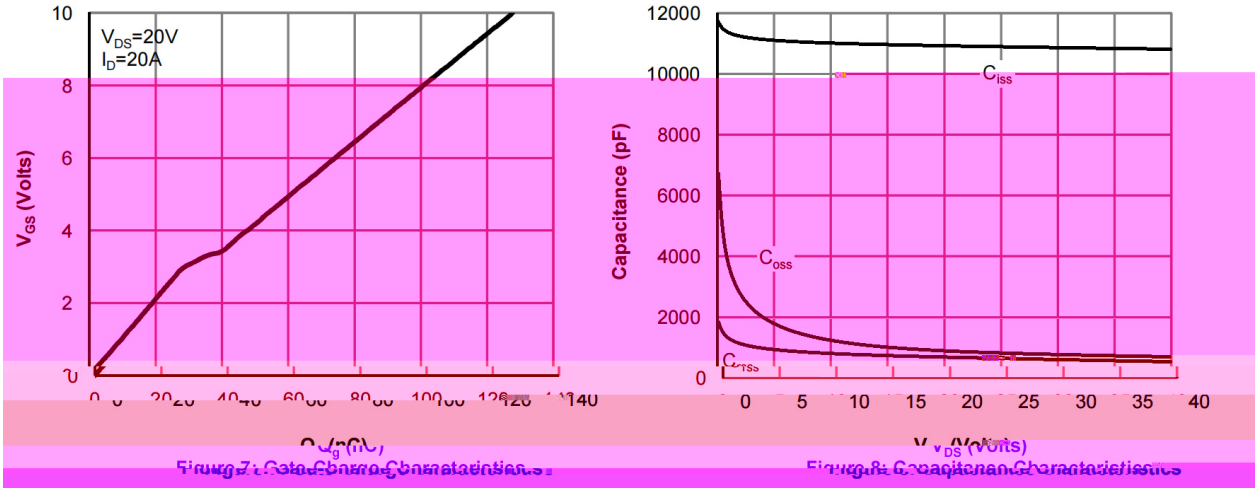
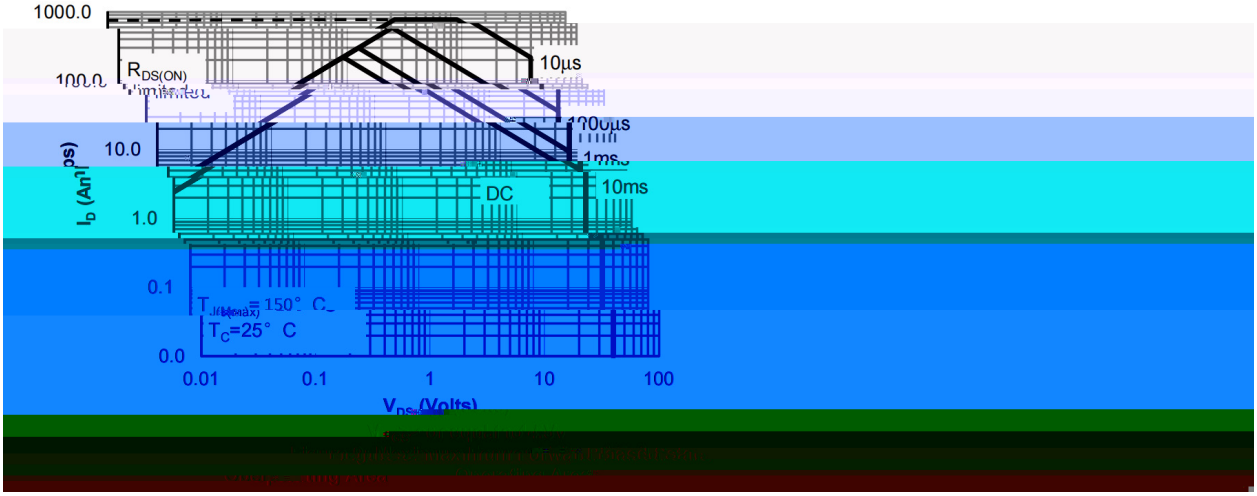


Figure 7: Gate Charge Characteristics

Figure 8: Capacitance Characteristics



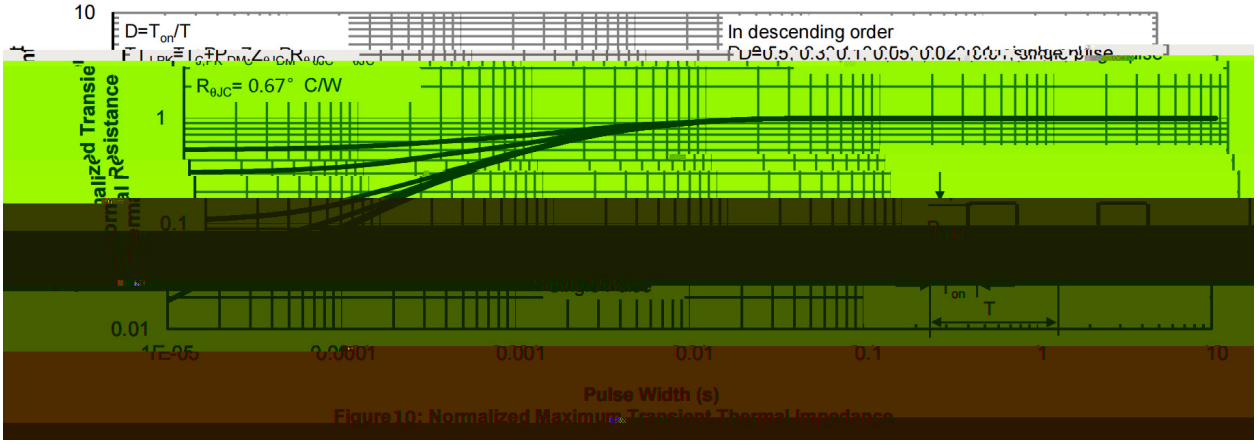
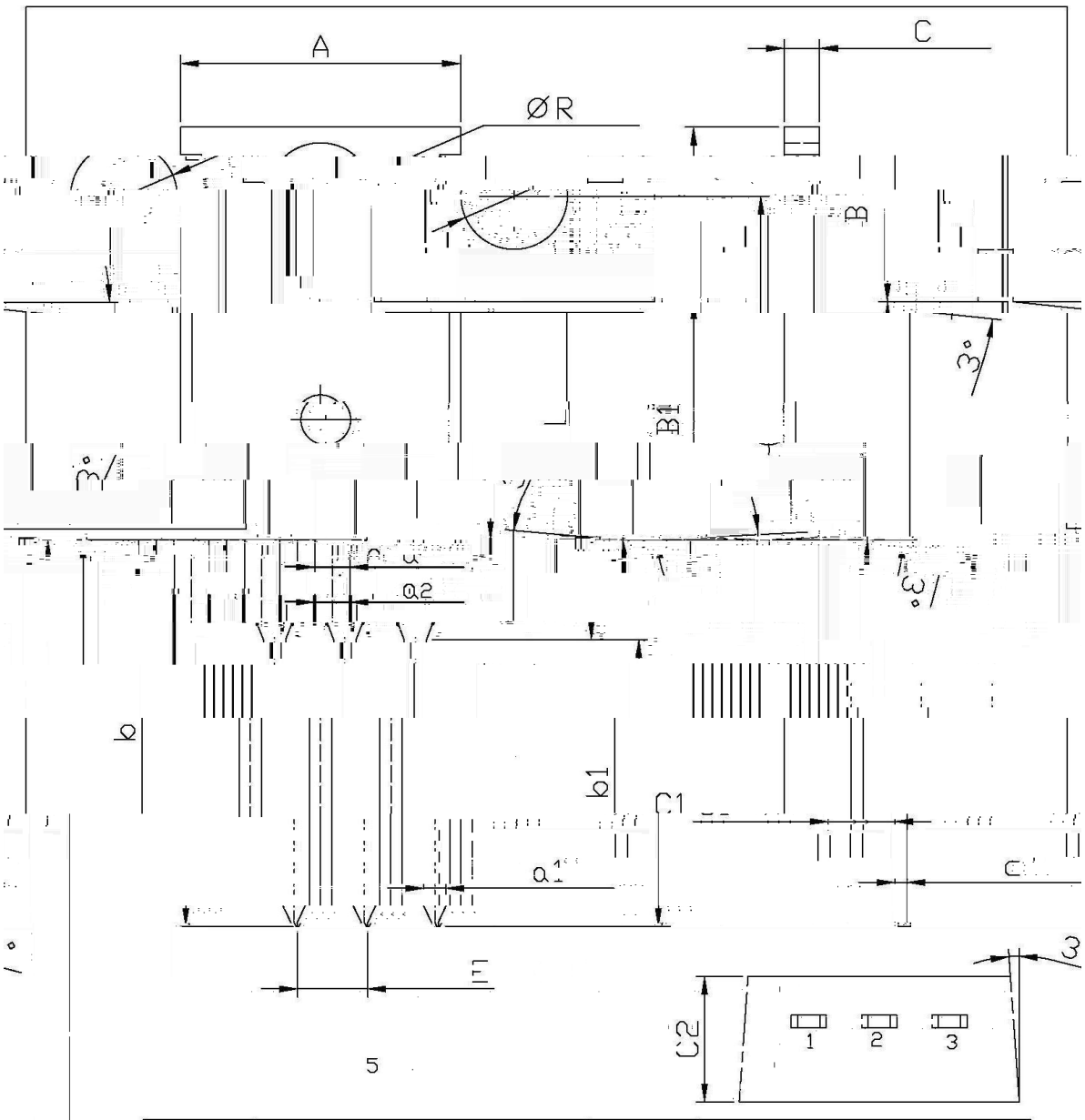


Figure 10: Normalized Maximum Transient Thermal Impedance

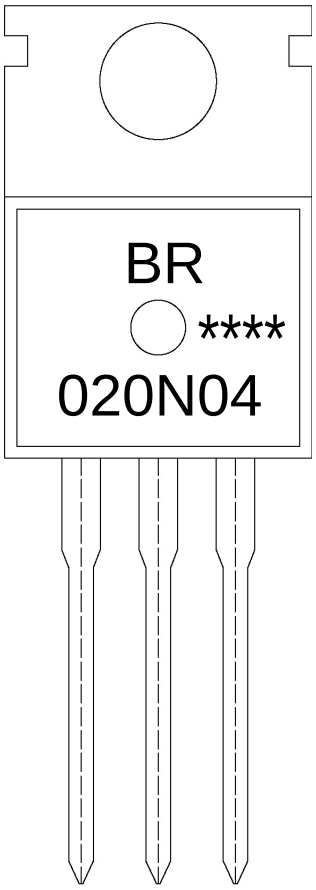
/ Package Dimensions

TO-220 单位：mm



Dimensions In Millimeters			Dimensions In Millimeters		
Symbol	Min	Max	Symbol	Min	Max
A	9.8	10.2	C	1.2	
R	3.56	3.64	B	6.3	
L	15.7	16.1	B1	9.0	
b	12.6	13.6	C1	2.2	

/ Marking Instructions



BR

020N04

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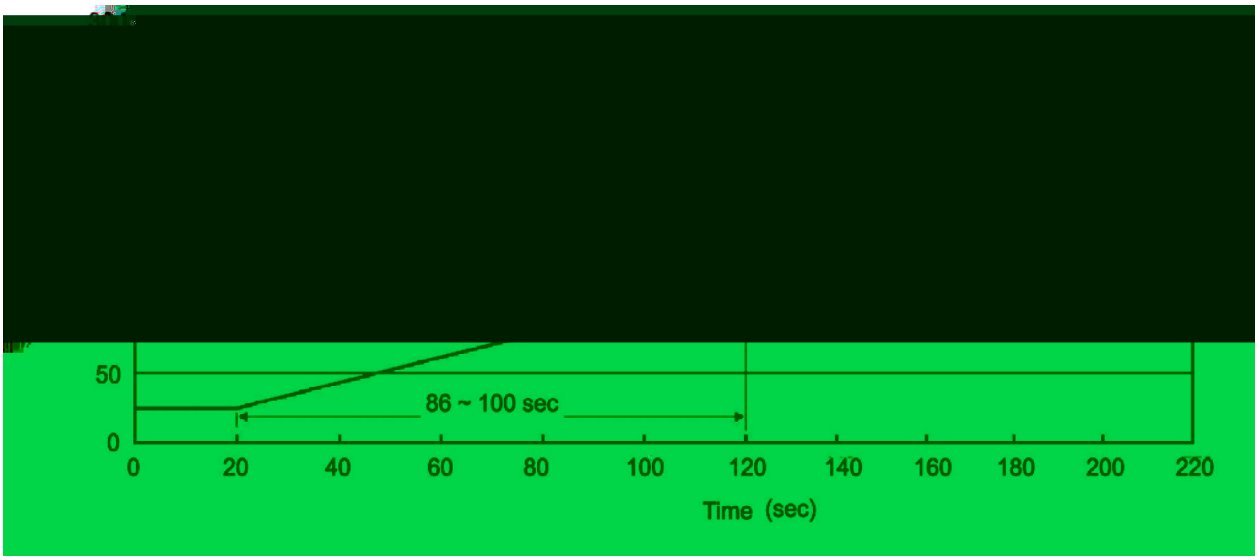
Note:

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;
1.Preheating:25~150 , Time:60~90sec.

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

3 2 10 /sec.
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 mm³)
	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 “"v T ” U ` %6 9 U T ‡V 9 ` 4 B ‘ôM ô9 U T B d M ` 9 U u M Y B „j F 'c $ b f ï B w H H ô 'u