



N-Channel Enhancement Mode Power MOSFET **MXB040N10**



DESCRIPTION

The MXB040N10 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 10V. This device is suitable for use as a wide variety of applications.



GENERAL FEATURES

- $V_{DS}=100V$, $I_D=128A$
 $R_{DS(ON)}(Typ.)=4.0m\Omega$ @ $V_{GS}=10V$
- High Power and current handling capability
- Lead free product is acquired

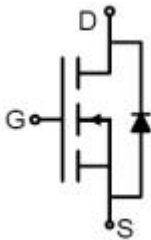


APPLICATION

- Uninterruptible power supply
- Hard switched and high frequency circuits



PINOUT



Schematic diagram



Marking and pin Assignment



TO-263-3L top view



ORDERING INFORMATION

Part Number	StorageTemperature	Package	Devices Per Reel
MXB040N10	-55°C to 175°C	TO-263	800



ABSOLUTE MAXIMUM RATINGS($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage($V_{GS}=0V$)	V_{DS}	100	V
Gate-Source Voltage($V_{DS}=0V$)	V_{GS}	± 20	V
Drain Current-Continuous($T_C=25^\circ C$)	I_D	128	A
Drain Current-Continuous($T_C=100^\circ C$)	I_D	81	A
Drain Current-Continuous@Current-Pulsed ^(Note1)	$I_{DM(pluse)}$	417	A
Maximum Power Dissipation($T_C=25^\circ C$)	P_D	167	W
Maximum Power Dissipation($T_C=100^\circ C$)	P_D	67	W
Avalanche energy ^(Note2)	E_{AS}	265	mJ
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 175	$^\circ C$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.75	$^\circ C/W$

Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

Note 2. E_{AS} condition: $T_J=25^\circ C$, $V_{DD}=40V$, $V_G=10V$, $R_g=25\Omega$, $L=0.5mH$.



ELECTRICAL CHARACTERISTICS ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =250μA	100	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =100V, V _{GS} =0V	-	-	1	μA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	2	-	4	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =10V, I _D =20A	-	4.0	5.5	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =20A	-	51	-	S
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =50V, V _{GS} =0V, F=1.0MHz	-	2816	-	pF
Output Capacitance	C _{oss}		-	614	-	pF
Reverse Transfer Capacitance	C _{rss}		-	7.4	-	pF
Gate Resistance	R _g	V _{GS} =0V,V _{DS} =0V,F=1.0MHz	-	2.4	-	Ω
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{GS} =10V, V _{DS} =50V, R _L =2.5Ω, R _{GEN} =6Ω	-	13	-	nS
Turn-on Rise Time	t _r		-	25	-	nS
Turn-Off Delay Time	t _{d(off)}		-	43	-	nS
Turn-Off Fall Time	t _f		-	37	-	nS
Total Gate Charge	Q _g	V _{DS} =50V, I _D =20A, V _{GS} =10V	-	42	-	nC
Gate-Source Charge	Q _{gs}		-	9.7	-	nC
Gate-Drain Charge	Q _{gd}		-	10.6	-	nC
Drain-Source Diode Characteristics						
Source-Drain Current(Body Diode)	I _{SD}		-	-	167	A
Forward on Voltage ^(Note1)	V _{SD}	V _{GS} =0V, I _S =40A	-	-	1.0	V
Reverse Recovery Time	t _{rr}	I _F =20A, dI/dt=100A/μs	-	60	-	nS
Reverse Recovery Charge	Q _{rr}		-	61	-	nC

Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Saturation Characteristics

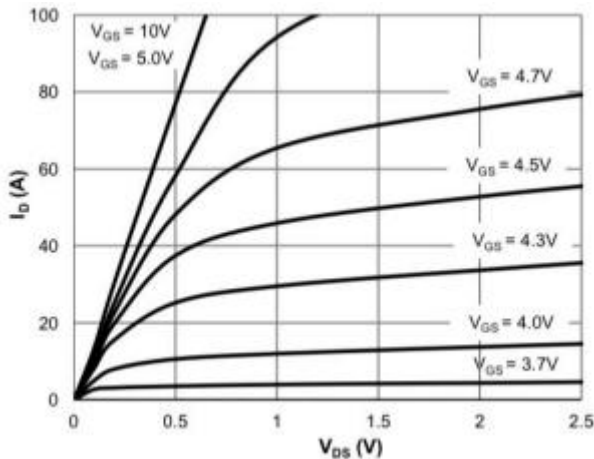


Figure 2. Transfer Characteristics

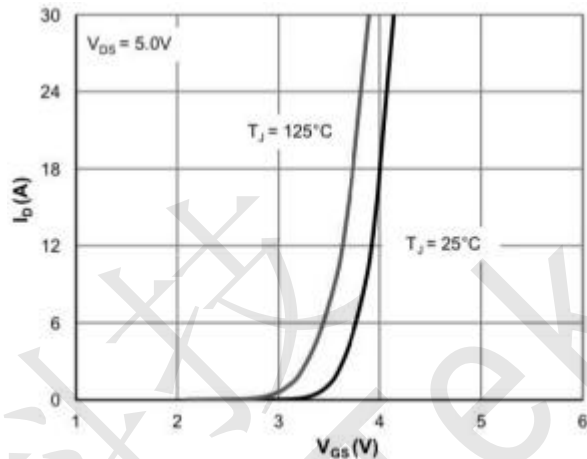


Figure 3. $R_{DS(ON)}$ vs. Drain Current

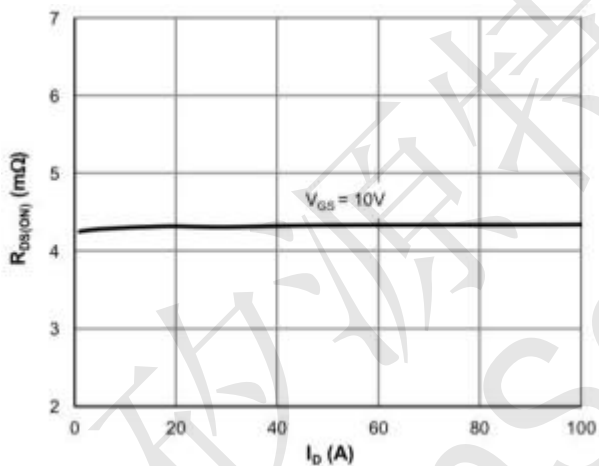


Figure 4. $R_{DS(ON)}$ vs. Junction Temperature

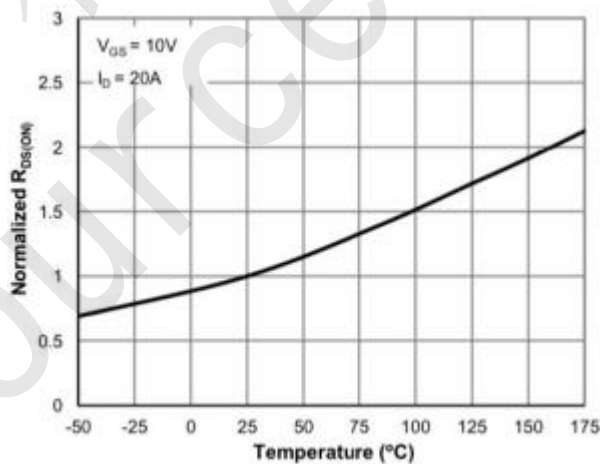


Figure 5. Body-Diode Characteristics

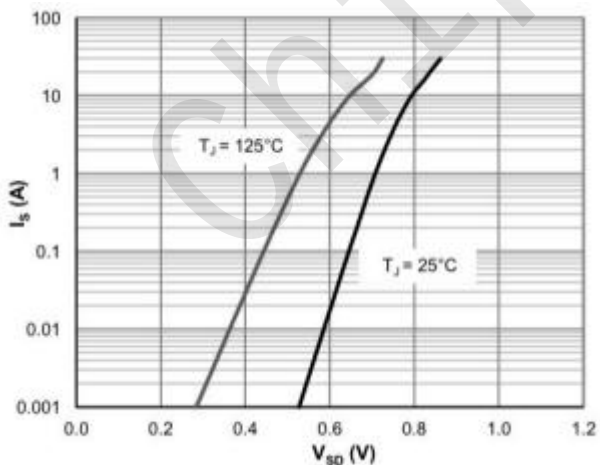
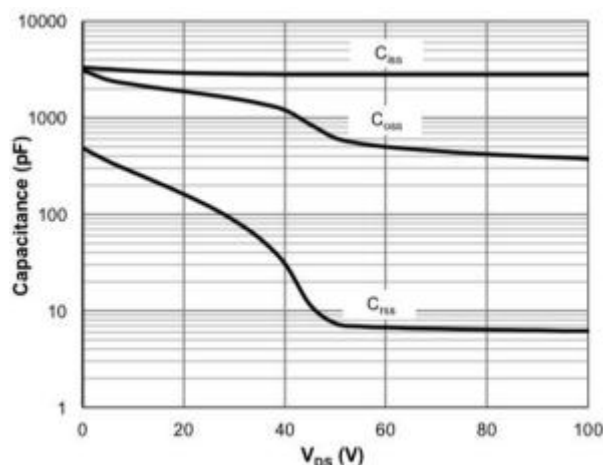


Figure 6. Capacitance Characteristics





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7. Current De-rating

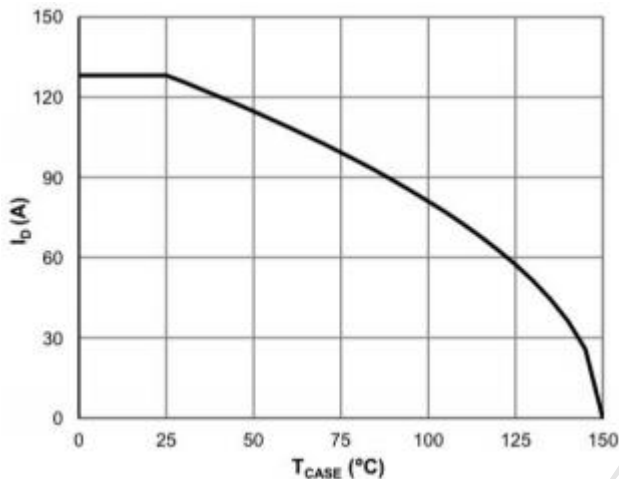


Figure 8. Power De-rating

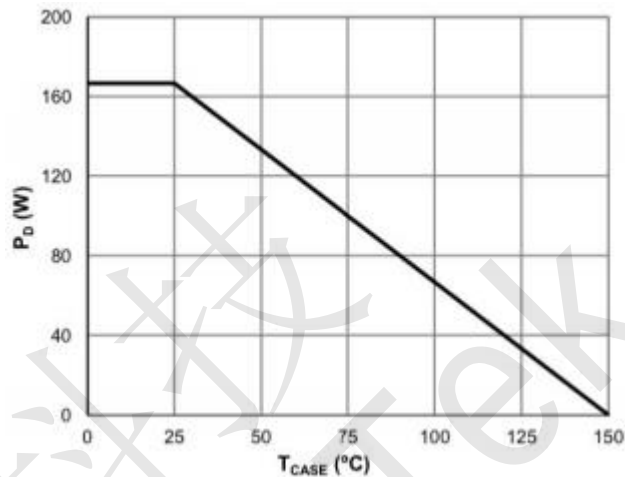


Figure 9. Maximum Safe Operating Area

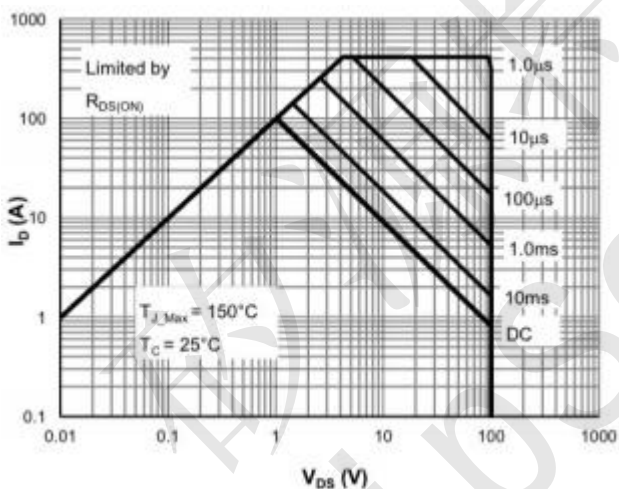


Figure 10. Single Pulse Power Rating, Junction-to-Case

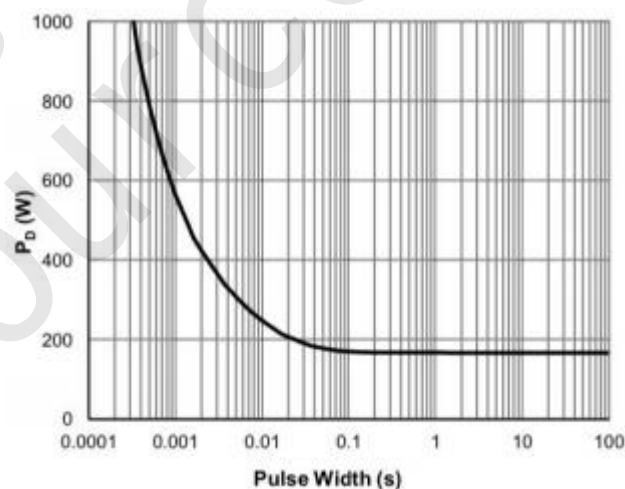
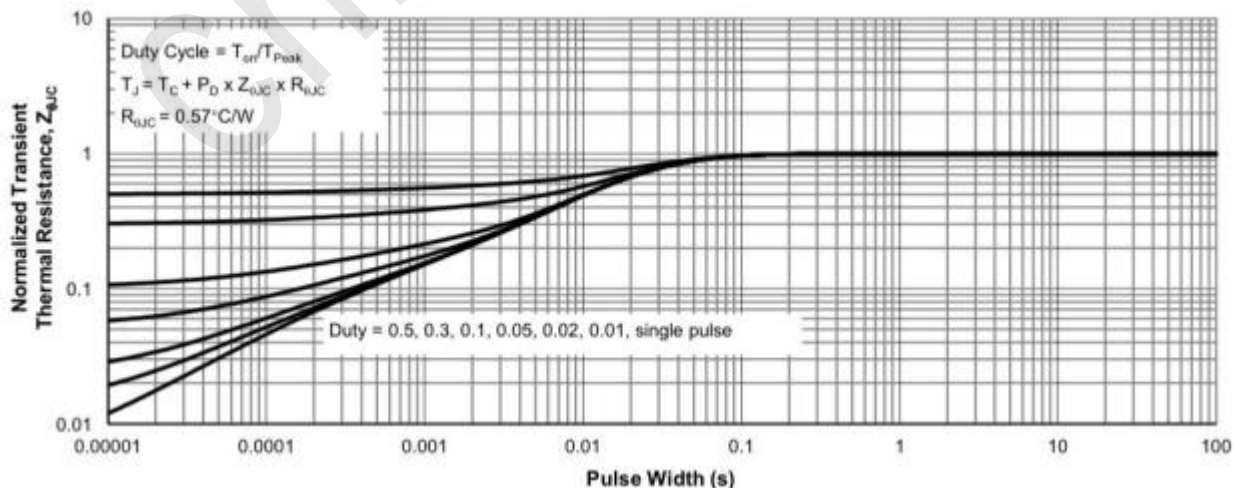


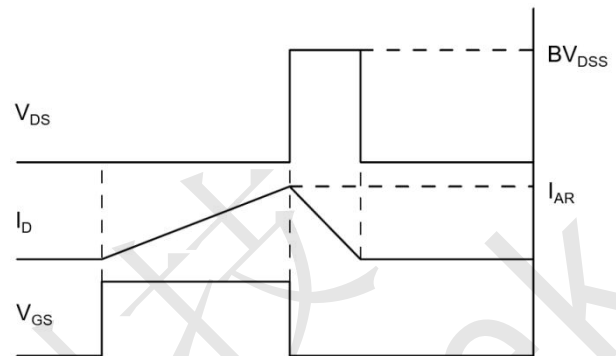
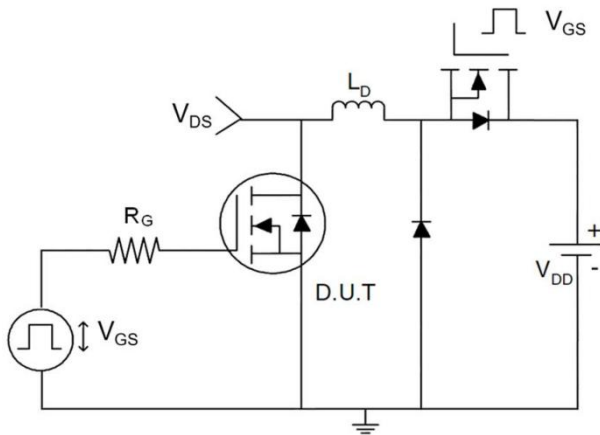
Figure 11. Normalized Maximum Transient Thermal Impedance



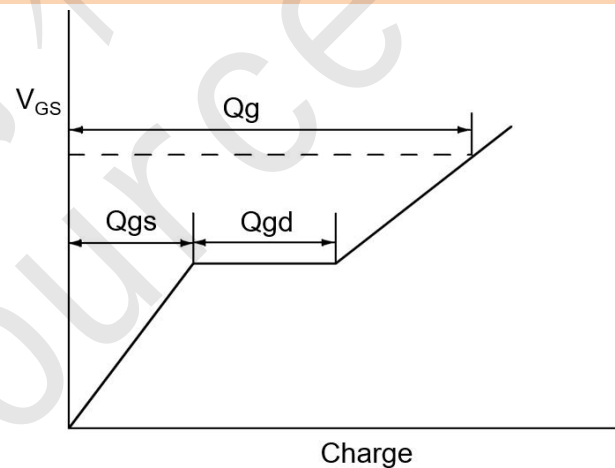
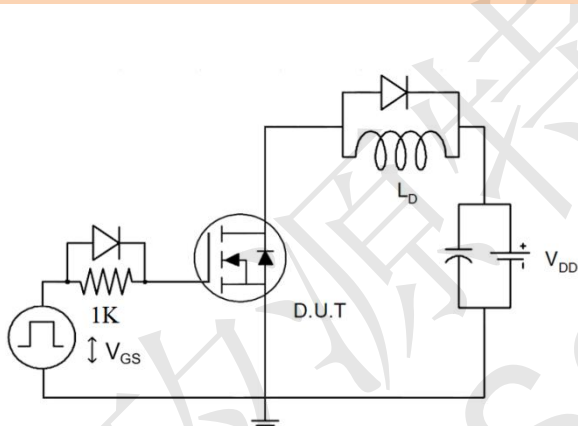


TEST CIRCUIT

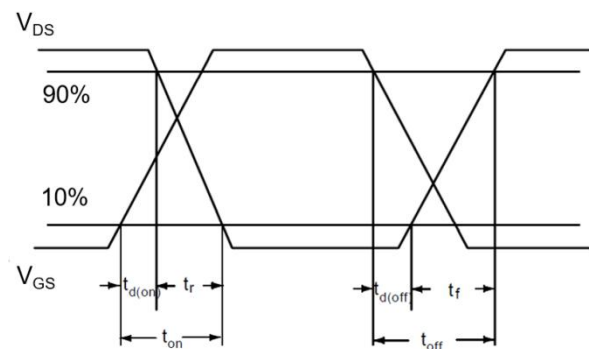
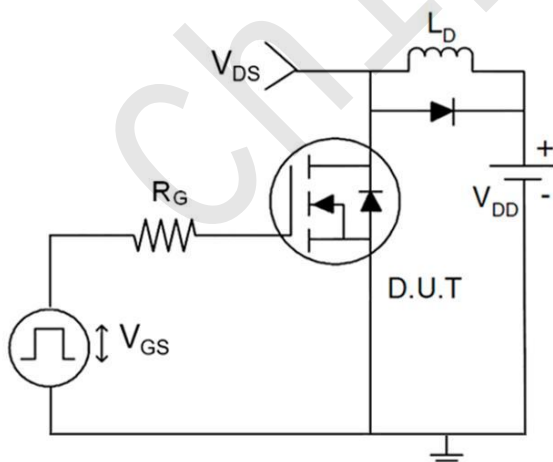
1. EAS Test Circuits



2. Gate Charge Test Circuits



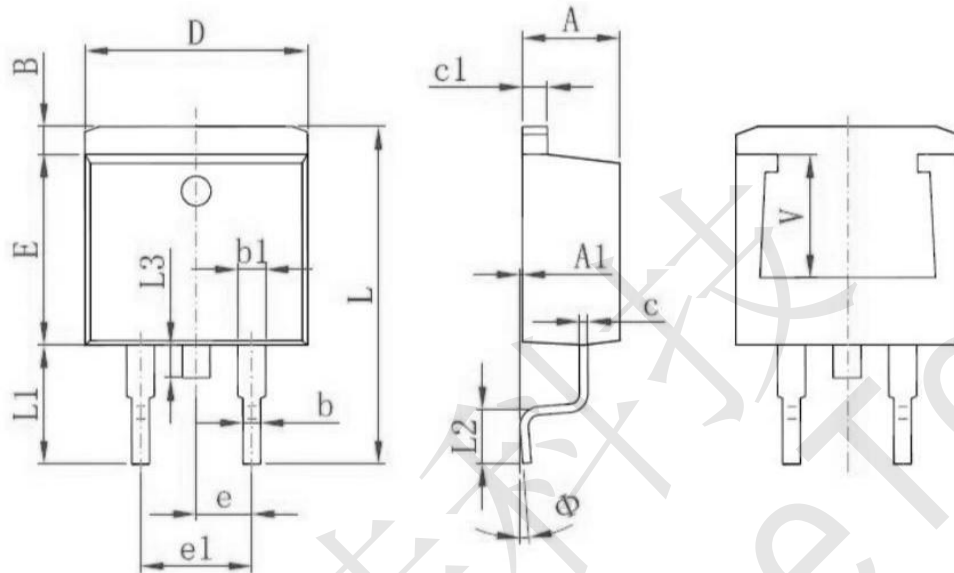
3. Switch Time Test Circuits





PACKAGE INFORMATION

TO-263



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Ma
A	4.470	4.670	0.176	0.184
A1	0.000	0.150	0.000	0.006
B	1.120	1.420	0.044	0.056
b	0.710	0.910	0.028	0.036
b1	1.170	1.370	0.046	0.054
c	0.310	0.530	0.012	0.021
c1	1.170	1.370	0.046	0.054
D	10.010	10.310	0.394	0.406
E	8.500	8.900	0.335	0.350
e	2.540 TYP.		0.100TYP.	
e1	4.980	5.180	0.196	0.204
L	14.940	15.500	0.588	0.610
L1	4.950	5.450	0.195	0.215
L2	2.340	2.740	0.092	0.108
L3	1.300	1.700	0.051	0.067
V	5.600 REF.		0.220REF.	
Φ	0°	8°	0°	8°