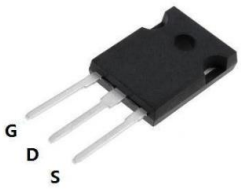
40A,500V N-CHANNEL POWER MOSFET

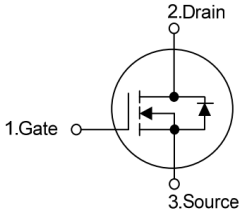
Features

- $R_{DS(on)}$=0.1Ω (Max.) @V_{GS}=10V,I_D=20A
- New technology for high voltage device
- Low C_{iss}
- Fast switching
- Low gate charge



Applications

- Power factor correction（PFC）
- Switched mode power supplies（SMPS）
- Uninterruptible Power Supply（UPS）



Key Performance and Package Parameters

Order codes	V_{DS}	I_D	$R_{DS(ON)}$, Typ	T_{vjmax}	Marking	Package
XD040M050BX1S3	500V	40A	0.1Ω	150℃	D40M50BX1	TO247-3

Absolute Maximum Ratings (T_c= 25℃ unless otherwise noted.)

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	500	V
V_{GSS}	Gate-Source Voltage	±30	V
I_D	Continuous Drain Current (T_C=25 ℃)	40	A
I_{DM}	Pulsed Drain Current	160	A
P_D	Maximum Power Dissipation (T_C=25 ℃)	263	W
E_{AS}	Avalanche Energy, Single Pulse （note1）	3267	mJ
T_J	Operating Junction Temperature Range	-55 to 150	℃
T_{STG}	Storage Temperature Range	-55 to 150	℃

Thermal Data

Symbol	Parameter	Conditions	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Steady State)	TO247-3	0.65	℃/W

Electrical Characteristics (T_C= 25℃ unless otherwise noted.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}= 0V, I_{DS}= 250uA	500	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=500V, V_{GS}=0V	---	---	1	uA
I_{GSS}	Gate Leakage Current, Forward	V_{GS}=30V, V_{DS}= 0V	---	---	100	nA
	Gate Leakage Current, Reverse	V_{GS}= -30V, V_{DS}= 0V	---	---	-100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}= V_{GS}, I_{DS}= 250uA	2	---	4	V
$R_{DS(ON)}$	Drain-Source On-state Resistance	V_{GS}=10V, I_{DS}=20A	--	0.085	0.1	Ω
Q_g	Total Gate Charge	V_{DS}=400V	---	411	---	nC
Q_{gs}	Gate-Source Charge	V_{GS}=10V	---	171	---	nC
Q_{gd}	Gate-Drain Charge	I_{DS}=20A	---	56	---	nC
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=250V R_G=10Ω R_D=33Ω	---	321.4	---	ns
t_r	Turn-on Rise Time		--	27.2	--	ns
$t_{d(off)}$	Turn-off Delay Time			209.8	---	ns
t_f	Turn-off Fall Time		---	46	---	ns
C_{iss}	Input Capacitance	V_{DS}=25V V_{GS}=0V f = 1MHz	---	8406	---	pF
C_{oss}	Output Capacitance		---	597	---	pF
C_{rss}	Reverse Transfer Capacitance		---	218	---	pF

Diode Characteristics (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{SD}	Diode Forward Voltage	I_{SD}=46A, V_{GS}=0V	---	---	1.2	V

Notes：

1. V_{DD}=50V, L=10mH, R_G=25Ω, starting, T_J=25℃.

Typical Characteristics

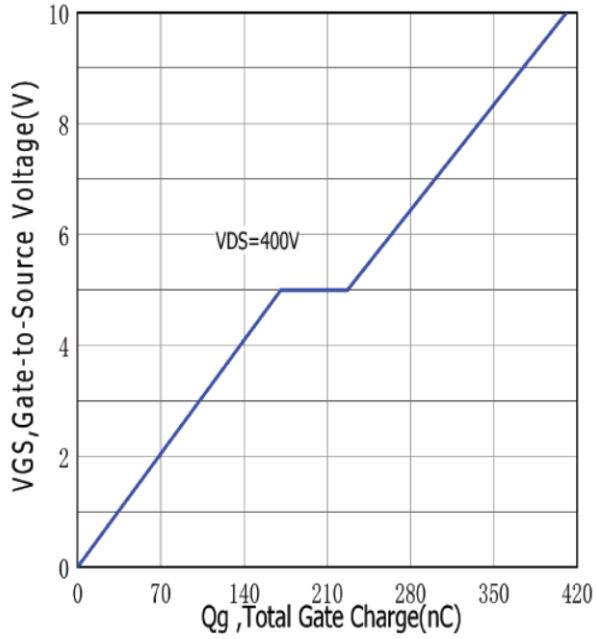


Fig.1 Gate Charge

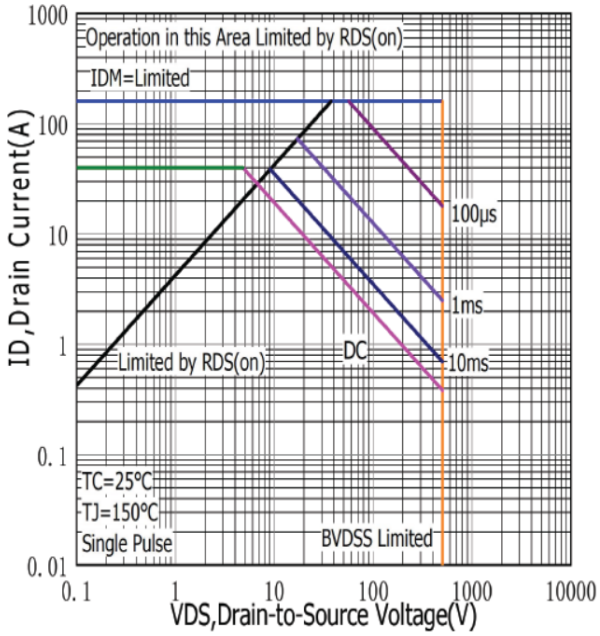


Fig.2 Safe Operation Area

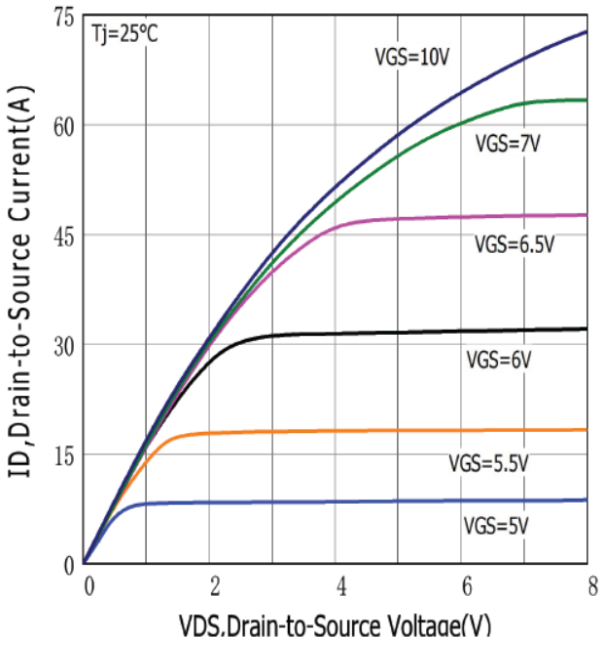


Fig.3 Output Characteristics

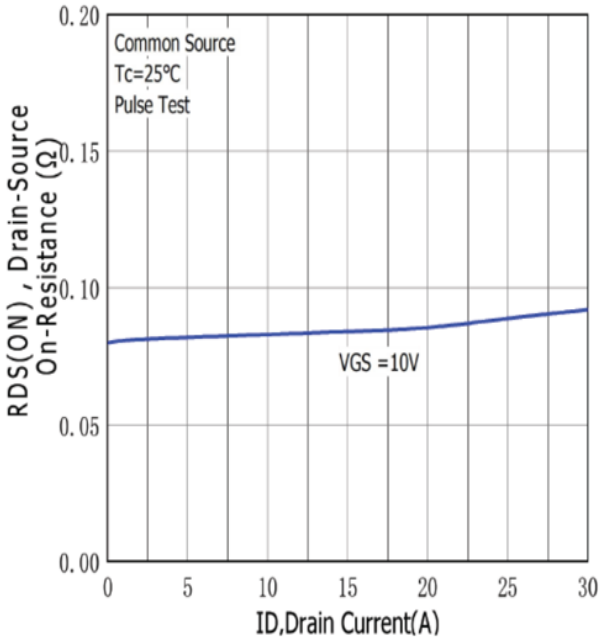


Fig.4 Drain-Source On Resistance

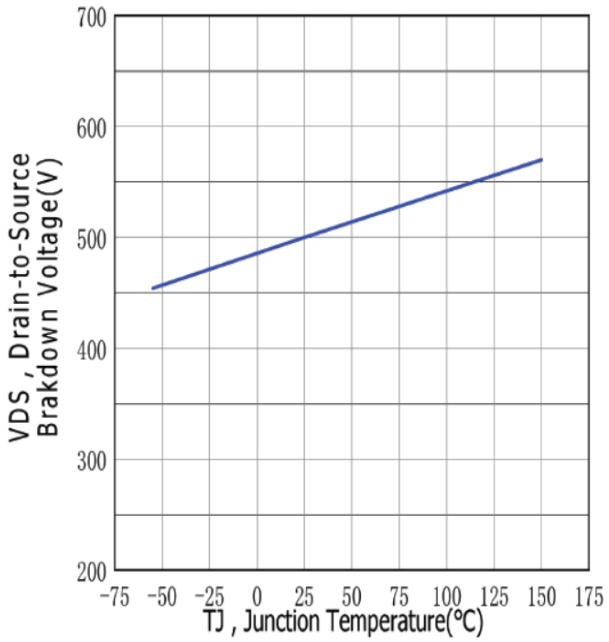


Fig.5 Drain-Source Breakdown Voltage

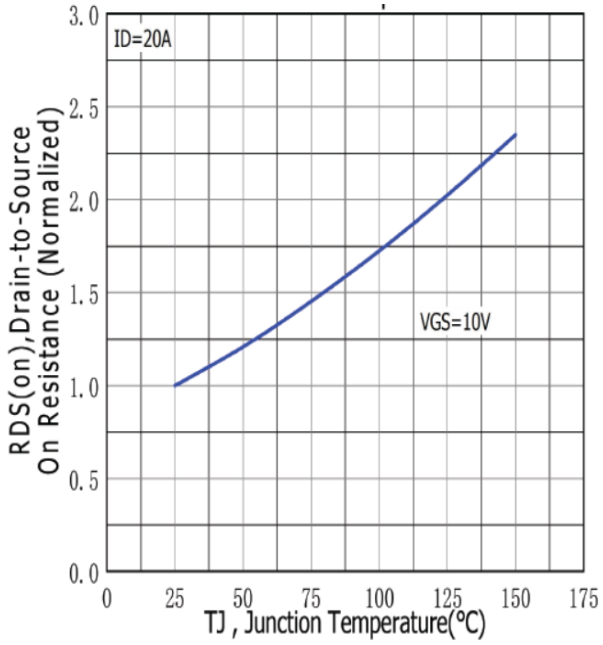


Fig.6 Drain-Source On Resistance

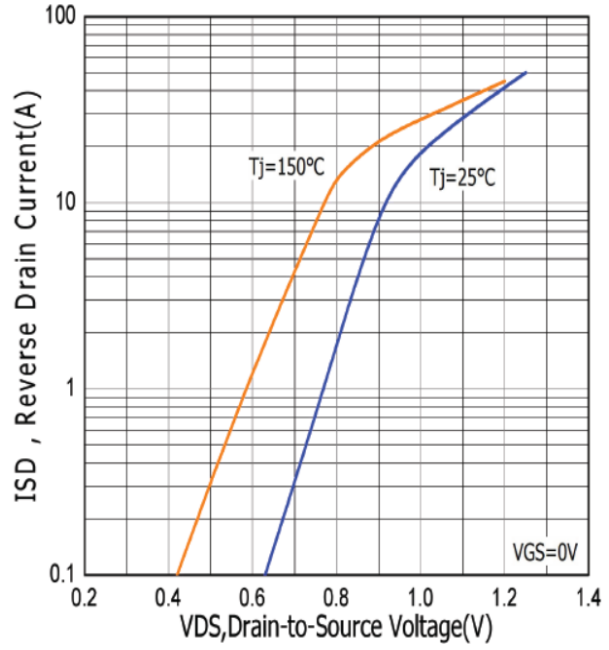


Fig.7 Source-Drain Diode Forward Current

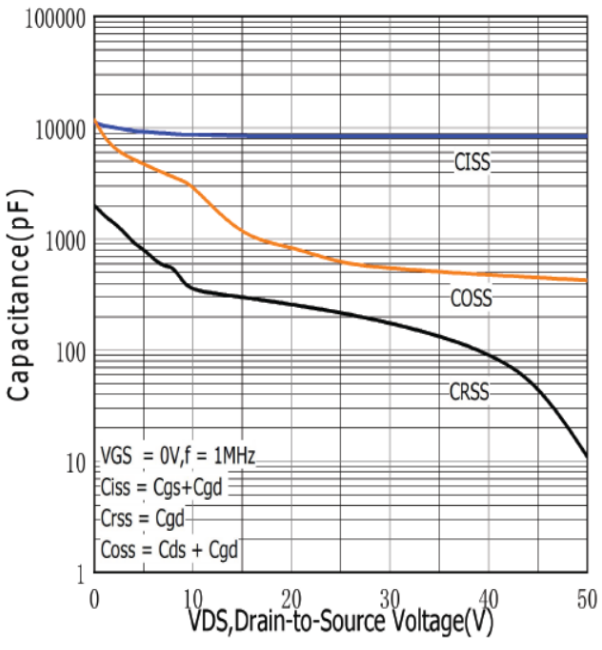
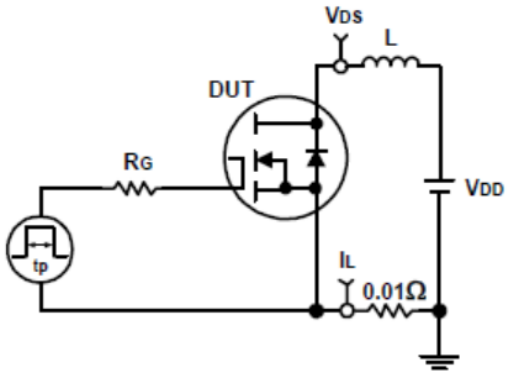
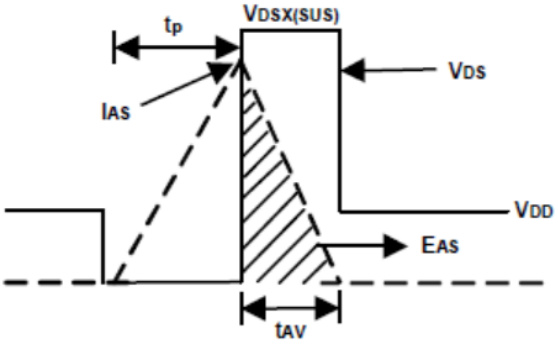


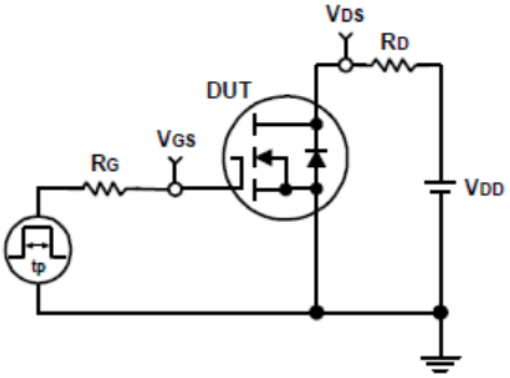
Fig.8 Capacitance

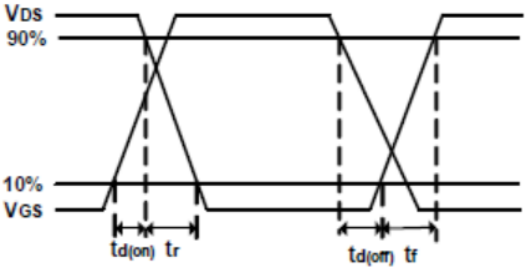
Avalanche Test Circuit and Waveforms





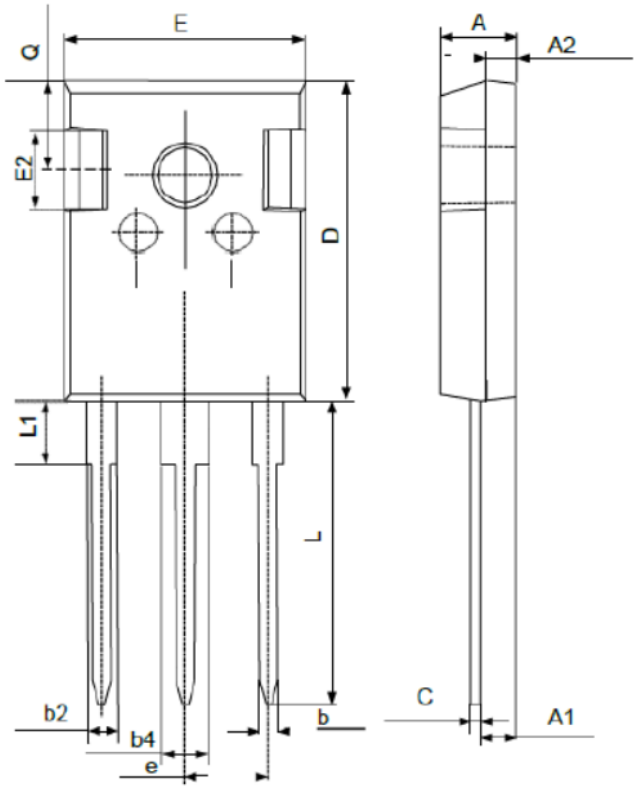
Switching Time Test Circuit and Waveforms





Package Information

TO-247



SYMBOL	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.21	2.41	2.59
A2	1.85	2.00	2.15
b	1.11	---	1.36
b2	1.91	---	2.25
b4	2.91	---	3.25
c	0.51	---	0.75
D	20.80	21.00	21.30
E	15.50	15.80	16.10
E2	4.40	5.00	5.20
e		5.44 BSC	
L	19.72	19.92	20.22
L1	---	---	4.30
Q	5.60	5.80	6.00