

28A,500V N-CHANNEL Power MOSFET

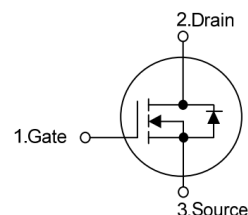
Features

- $R_{DS(on)}=0.24\Omega$ (Max.) @ $V_{GS}=10V, I_D=28A$
- New technology for high voltage device
- Low on-resistance
- Low C_{iss}
- Fast switching



Applications

- LED power supplies
- Cell Phone Charger
- Standby Power



Key Performance and Package Parameters

Order codes	V_{DS}	I_D	$R_{DS(ON)}$, Typ	T_{vjmax}	Marking	Package
XD028M050BX1S3	500V	28A	0.2 Ω	150 $^{\circ}C$	D28M50BX1	TO247-3

Absolute Maximum Ratings (T_c= 25 $^{\circ}C$ 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 $^{\circ}C$)	28	A
I_{DM}	Pulsed Drain Current	98	A
P_D	Maximum Power Dissipation (T _C =25 $^{\circ}C$)	85	W
E_{AS}	Avalanche Energy, Single Pulse (note1)	1851	mJ
T_J	Operating Junction Temperature Range	-55 to 150	$^{\circ}C$
T_{STG}	Storage Temperature Range	-55 to 150	$^{\circ}C$

Thermal Data

Symbol	Parameter	Conditions	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case (Steady State)	TO247-3	1.47	$^{\circ}C/W$

Electrical Characteristics ($T_c=25^\circ\text{C}$ unless otherwise noted.)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_{DS}=250\mu A$	500	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{DS}=500V, V_{GS}=0V$	---	---	1	μA
I_{GSS}	Gate Leakage Current, Forward	$V_{GS}=20V, V_{DS}=0V$	---	---	100	nA
	Gate Leakage Current, Reverse	$V_{GS}=-20V, V_{DS}=0V$	---	---	-100	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	2.0	3.1	4.0	V
$R_{DS(ON)}$	Drain-Source On-state Resistance	$V_{GS}=10V, I_{DS}=14A$	--	0.2	0.24	Ω
Q_g	Total Gate Charge	$V_{DS}=250V$	---	73.3	---	nC
Q_{gs}	Gate-Source Charge	$V_{GS}=10V$	---	30.6	---	nC
Q_{gd}	Gate-Drain Charge	$I_{DS}=28A$	---	13.8	---	nC
$t_{d(on)}$	Turn-on Delay Time	$V_{DD}=250V$ $I_{DS}=14A$ $R_G=25\Omega$	---	63.8	---	ns
t_r	Turn-on Rise Time		--	55.6	--	ns
$t_{d(off)}$	Turn-off Delay Time		---	205	---	ns
t_f	Turn-off Fall Time		---	63.4	---	ns
C_{iss}	Input Capacitance	$V_{DS}=25V$	---	4454	---	pF
C_{oss}	Output Capacitance	$V_{GS}=0V$	---	367	---	pF
C_{rss}	Reverse Transfer Capacitance	$f=1\text{MHz}$	---	43	---	pF

Diode Characteristics ($T_c=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Units
V_{SD}	Diode Forward Voltage	$I_S=28A, V_{GS}=0V$	---	0.9	---	V
t_{rr}	Diode Reverse Recovery Time	$I_{SD}=28A,$ $di_f/dt=100A/s$	---	407	---	ns
Q_{rr}	Diode Reverse Recovery Charge		---	6193	---	nC

Notes:

1. $V_{DD}=50V, V_G=10V, I_{AS}=6A, R_G=25\Omega$, starting, $T_J=25^\circ\text{C}$.

Typical Characteristics

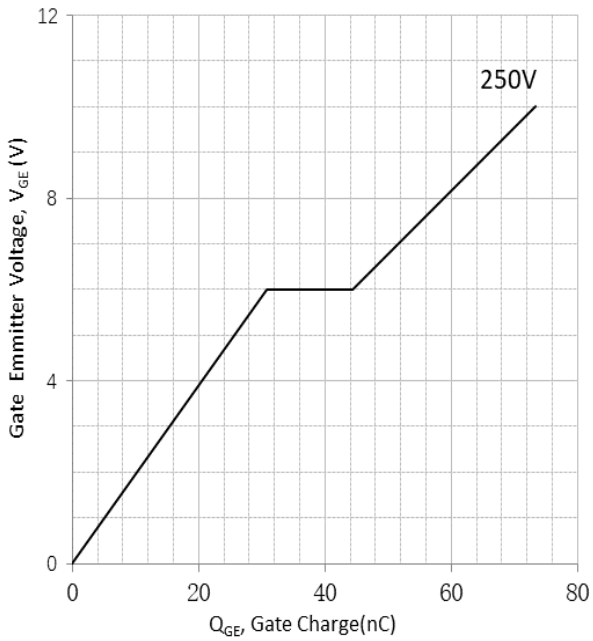


Fig.1 Gate Charge

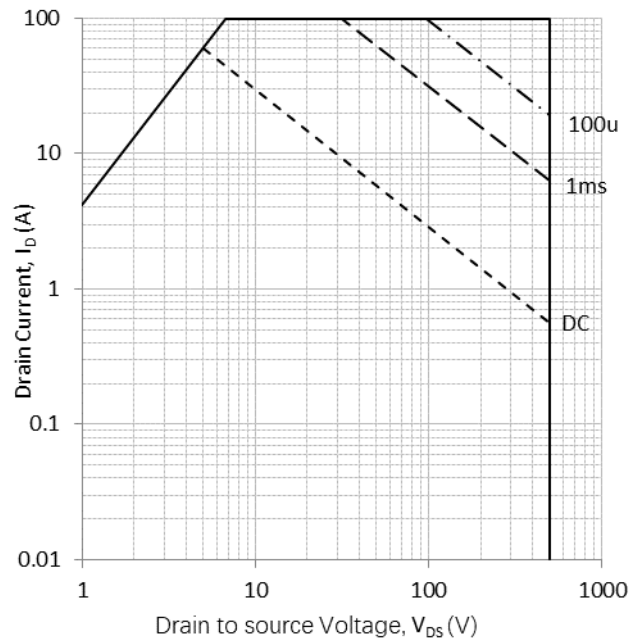


Fig.2 Safe Operation Area

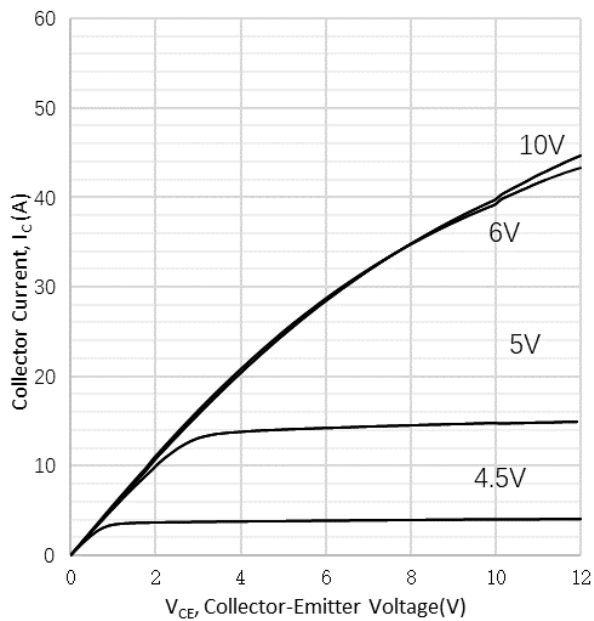


Fig.3 Output Characteristics

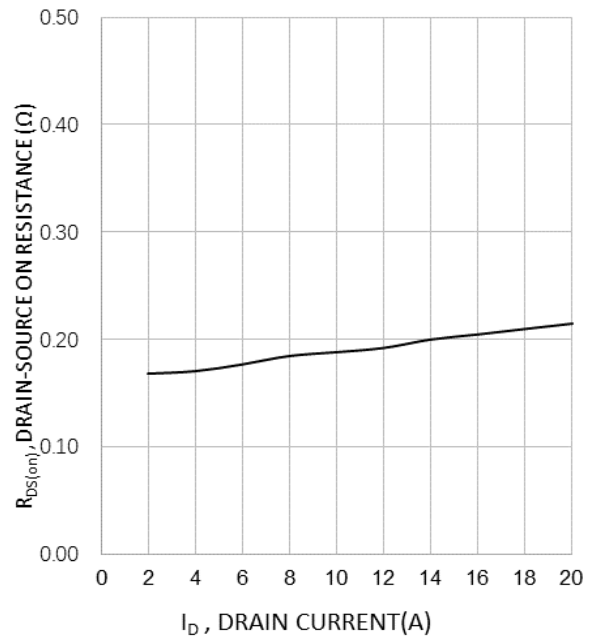


Fig.4 Drain-Source On Resistance

T_{VJ}=25°C

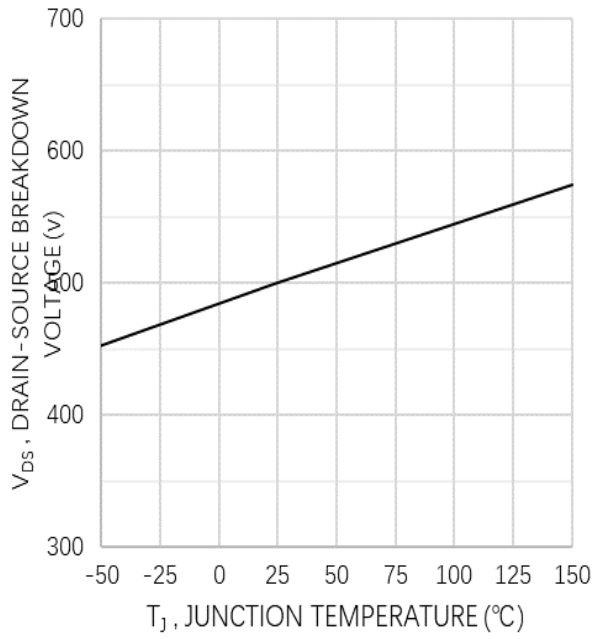


Fig.5 Breakdown Voltage

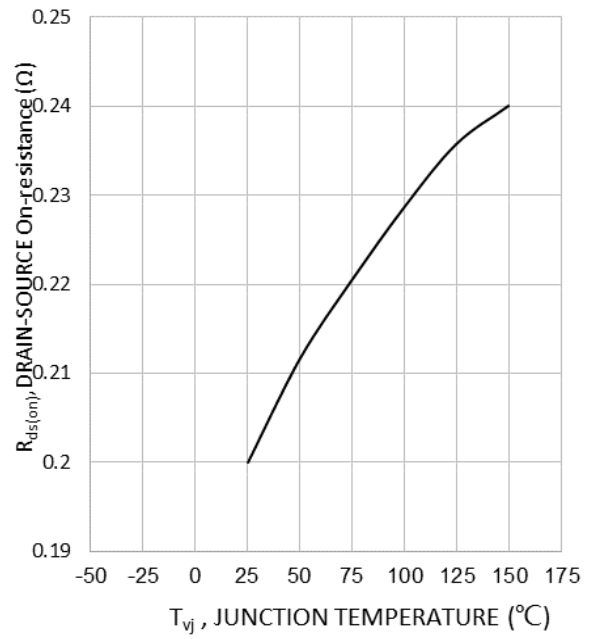


Fig.6 Drain-Source On Resistance

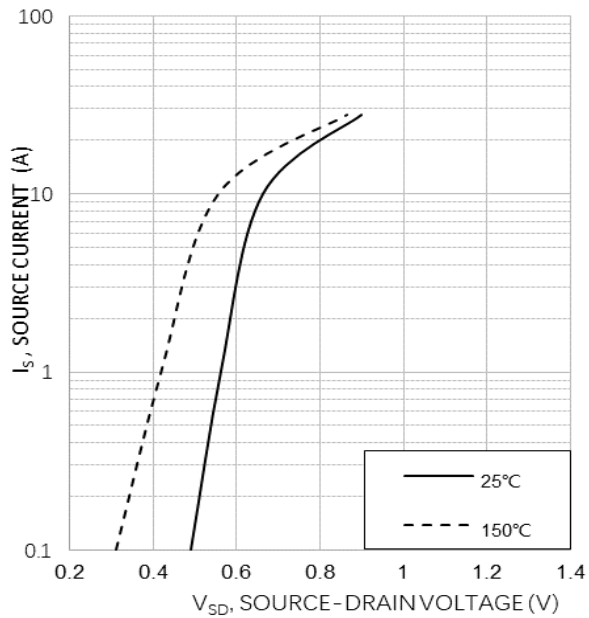


Fig.7 Source-Drain Diode Forward Current

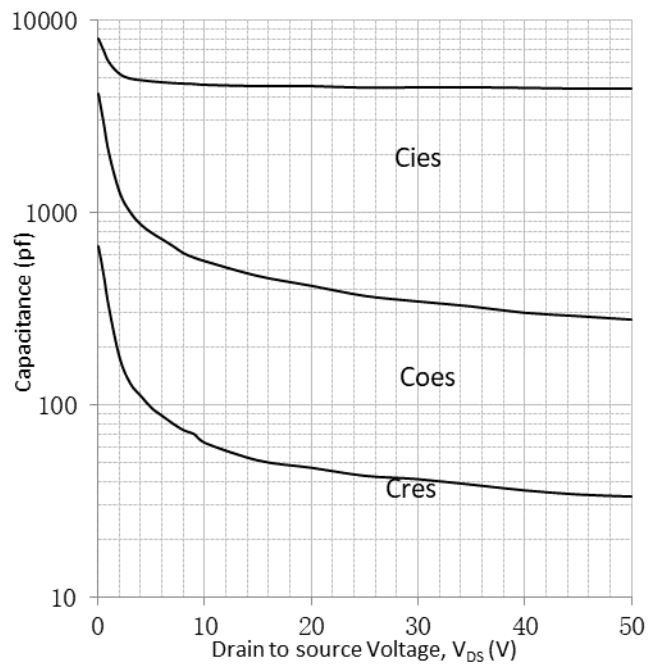
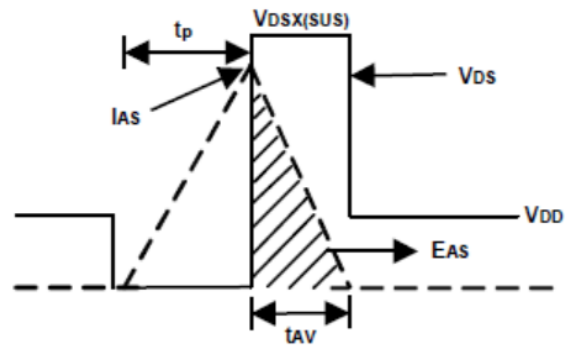
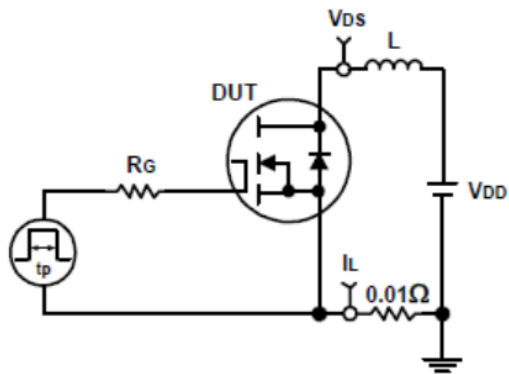
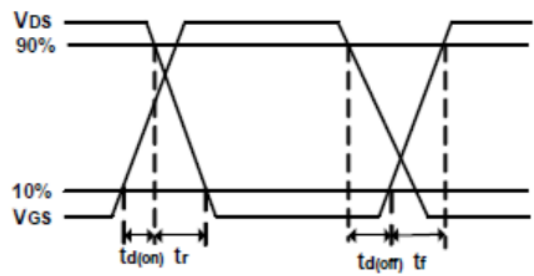
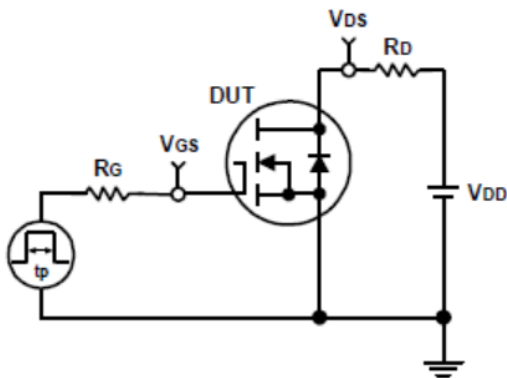


Fig.8 Capacitance

Avalanche Test Circuit and Waveforms

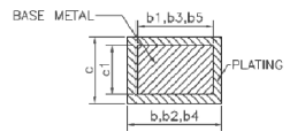
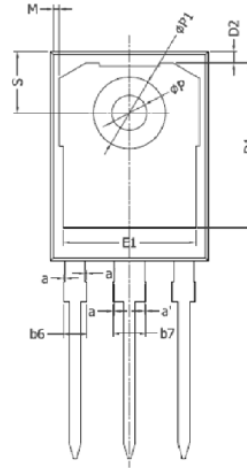
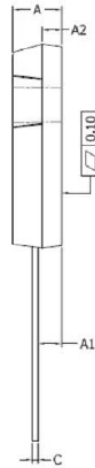
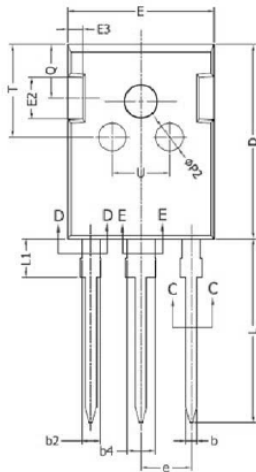


Switching Time Test Circuit and Waveforms



Package Information

TO-247



SECTION C-C, D-D & E-E

COMMON DIMENSIONS
(UNITS OF MEASURE =MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	4.90	5.00	5.10
A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
a	0	---	0.15
a'	0	---	0.15
b	1.16	---	1.26
b1	1.15	1.2	1.22
b2	1.96	---	2.06
b3	1.95	2.00	2.02
b4	2.96	---	3.06
b5	2.96	3.00	3.02
b6	---	---	2.25
b7	---	---	3.25
c	0.59	---	0.66
c1	0.58	0.60	0.62
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	1.05	1.17	1.35
E	15.70	15.80	15.90
E1	13.10	13.30	13.50
E2	4.40	4.50	4.60
E3	1.50	1.60	1.70
e	5,436 BSC		
L	19.80	19.92	20.10
L1	---	---	4.30
M	0.35	---	0.95
P	3.40	3.50	3.60
P1	7.00	---	7.40
P2	2.40	2.50	2.60
Q	5.60	---	6.00
S	6.05	6.15	6.25
T	9.80	---	10.20
U	6.00	---	6.40

NOTES:

ALL DIMENSIONS REFER TO JEDEC STANDARD TO-247 AND DO NOT INCLUDE MOLD FLASH OR PROTRUSIONS.

EJECTION MARK DEPTH $0.10^{+0.15}_{-0.10}$