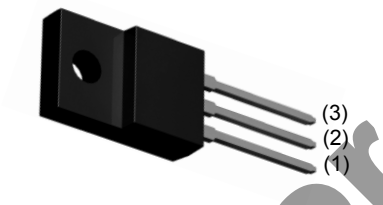
ZDX050N50

Nch 500V 5A Power MOSFET Datasheet

V_{DSS}	500V
$R_{DS(on)}$ (Max.)	1.5Ω
I_D	5A
P_D	40W

●Outline

TO-220FM



●Features

1) Low on-resistance.

2) Fast switching speed.

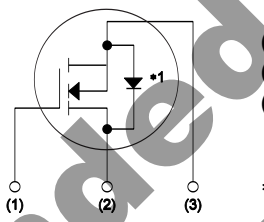
3) Gate-source voltage (V_{GSS}) guaranteed to be ±30V.

4) Drive circuits can be simple.

5) Parallel use is easy.

6) Pb-free lead plating ; RoHS compliant

●Inner circuit



(1) Gate
(2) Drain
(3) Source

*1 BODY DIODE

●Application

Switching Power Supply

●Packaging specifications

Type	Packaging	Bulk
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	500
	Taping code	-
	Marking	ZDX050N50

●Absolute maximum ratings(T_a = 25°C)

Parameter		Symbol	Value	Unit
Drain - Source voltage		V_{DSS}	500	V
Continuous drain current	T_c = 25°C	I_D *1	±5	A
Pulsed drain current		$I_{D,pulse}$ *2	±15	A
Gate - Source voltage		V_{GSS}	±30	V
Power dissipation (T_c = 25°C)		P_D	40	W
Junction temperature		T_j	150	°C
Range of storage temperature		T_{stg}	−55 to +150	°C

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●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA}	-	-	3.125	°C/W

●Electrical characteristics(T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Drain - Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 1mA	500	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 500V, V_{GS} = 0V	-		100	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±30V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS\ (th)}$	V_{DS} = 10V, I_D = 1mA	2.5	-	4.4	V
Static drain - source on - state resistance	$R_{DS(on)}$ *3	V_{GS} = 10V, I_D = 2.5A	-	1.2	1.5	Ω

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●**Electrical characteristics**(T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Transconductance	g_{fs} *3	V_{DS} = 10V, I_D = 2.5A	1	4	-	S
Input capacitance	C_{iss}	V_{GS} = 0V	-	600	-	pF
Output capacitance	C_{oss}	V_{DS} = 25V	-	62	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	5	-	
Turn - on delay time	$t_{d(on)}$ *3	V_{DD} ≃ 250V, V_{GS} = 10V	-	20	-	ns
Rise time	t_r *3	I_D = 2.5A	-	12	-	
Turn - off delay time	$t_{d(off)}$ *3	R_L = 10Ω	-	38	-	
Fall time	t_f *3	R_G = 10Ω	-	22	-	

●**Gate Charge characteristics**(T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Total gate charge	Q_g *3	V_{DD} ≃ 250V	-	14	-	nC
Gate - Source charge	Q_{gs} *3	I_D = 5A	-	6	-	
Gate - Drain charge	Q_{gd} *3	V_{GS} = 10V	-	4	-	
Gate plateau voltage	$V_{(plateau)}$	V_{DD} ≃ 250V, I_D = 5A	-	6	-	V

*1 Limited only by maximum temperature allowed.

*2 Pw ≤ 10μs, Duty cycle ≤ 1%

*3 Pulsed

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●**Body diode electrical characteristics** (Source-Drain)(T_a = 25°C)

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S *1	T_c = 25°C	-	-	5	A
Inverse diode direct current, pulsed	I_{SM} *2		-	-	15	A
Forward voltage	V_{SD} *3	V_{GS} = 0V, I_S = 5A	-	-	1.5	V

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●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

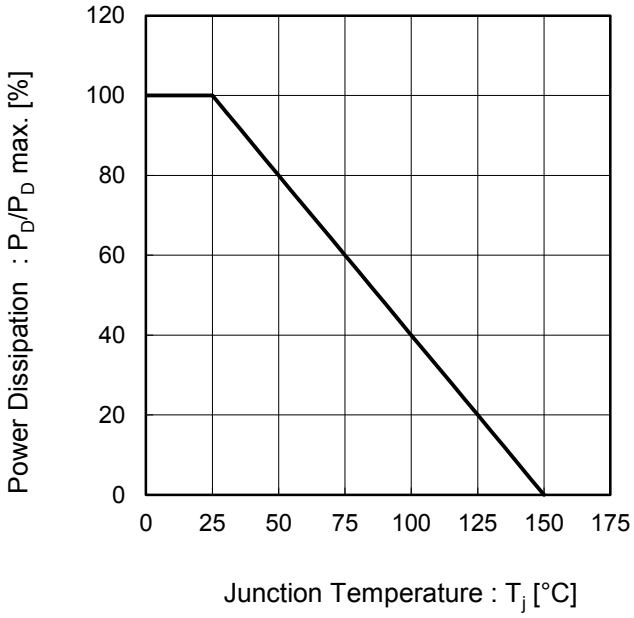


Fig.2 Maximum Safe Operating Area

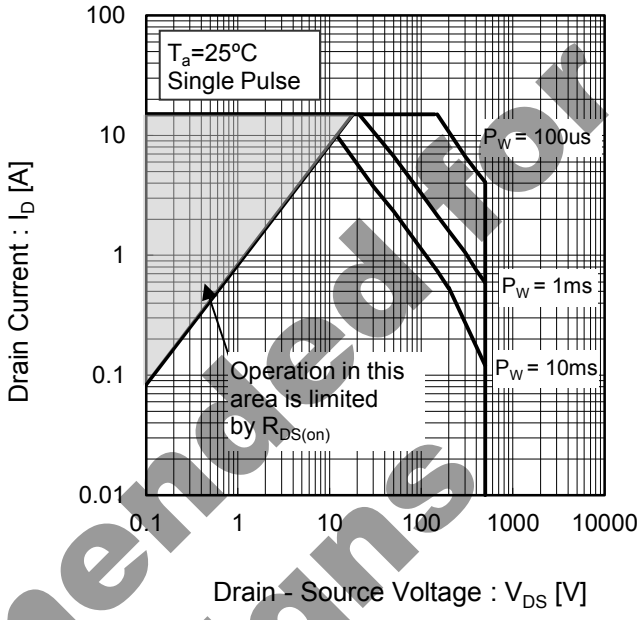
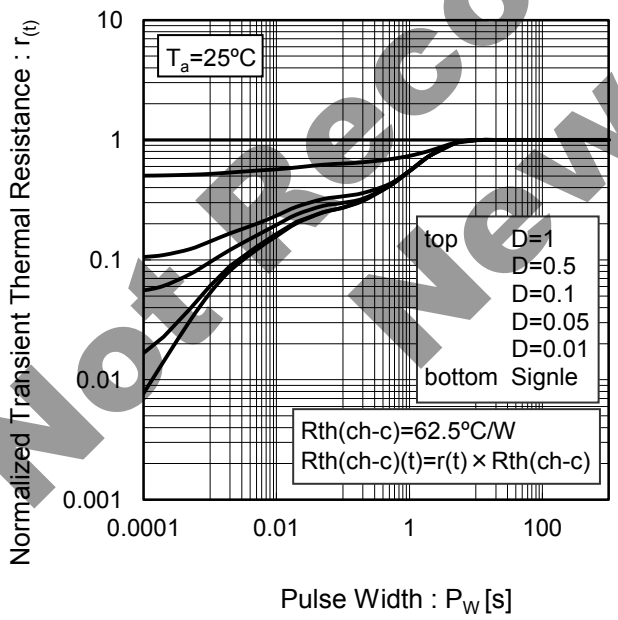


Fig.3 Normalized Transient Thermal Resistance vs. Pulse Width



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Fig.4 Typical Output Characteristics(I)

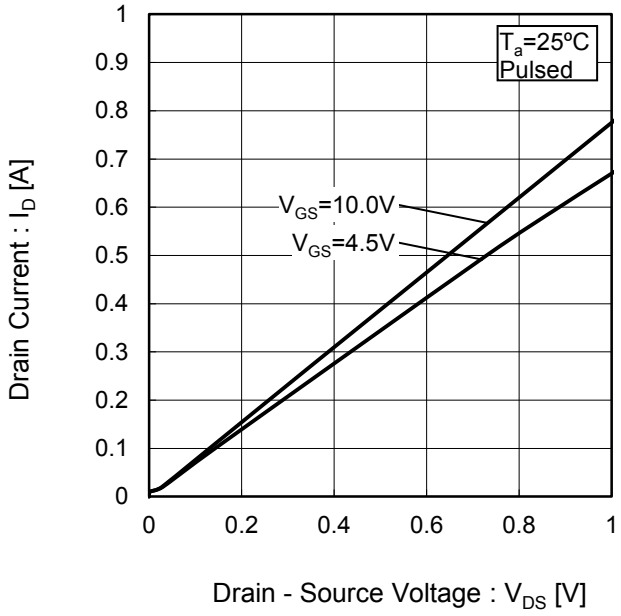


Fig.5 Typical Output Characteristics(II)

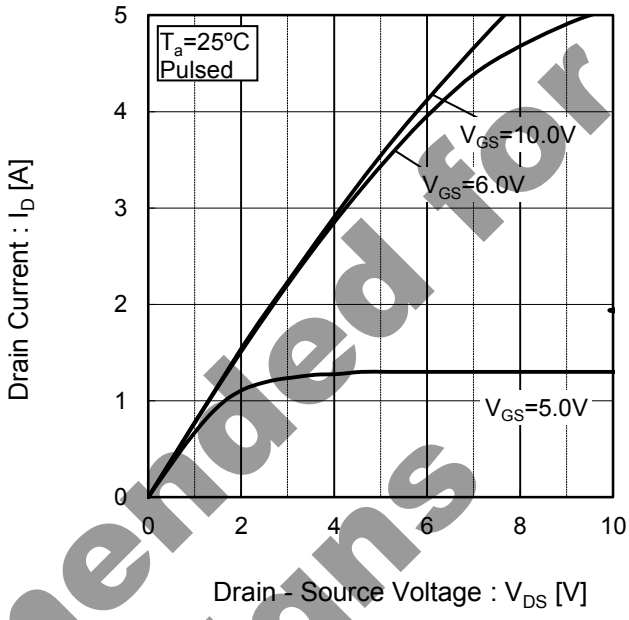


Fig.6 Breakdown Voltage vs. Channel Temperature

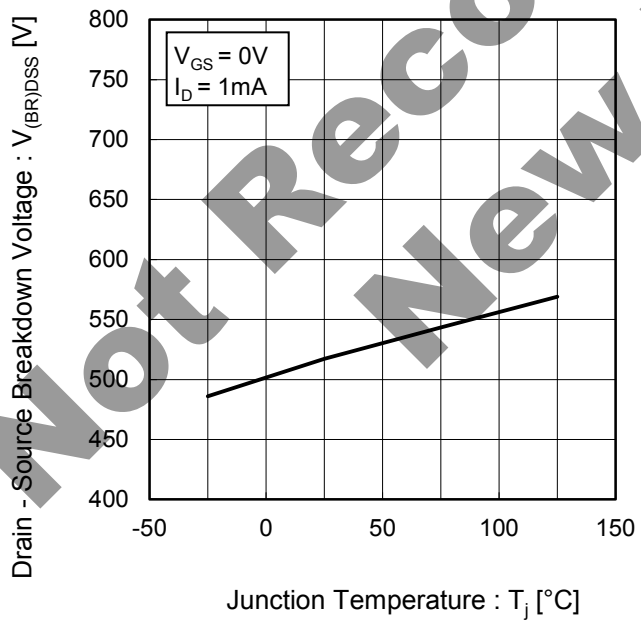
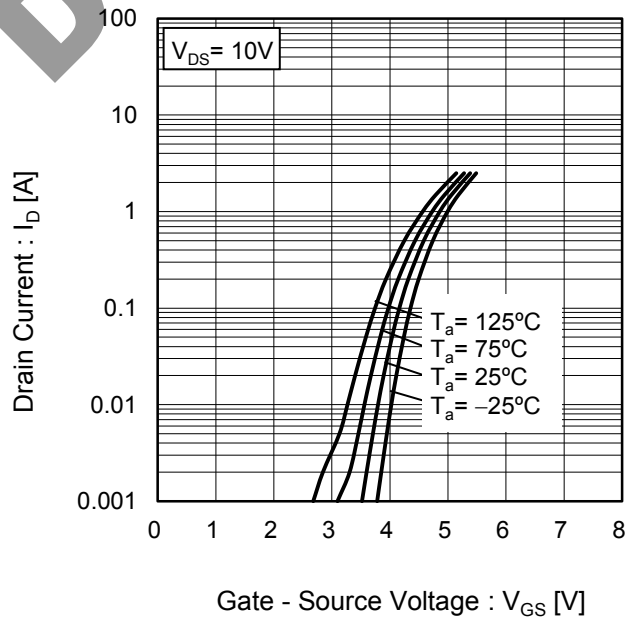


Fig.7 Typical Transfer Characteristics



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Fig.8 Gate Threshold Voltage vs. Channel Temperature

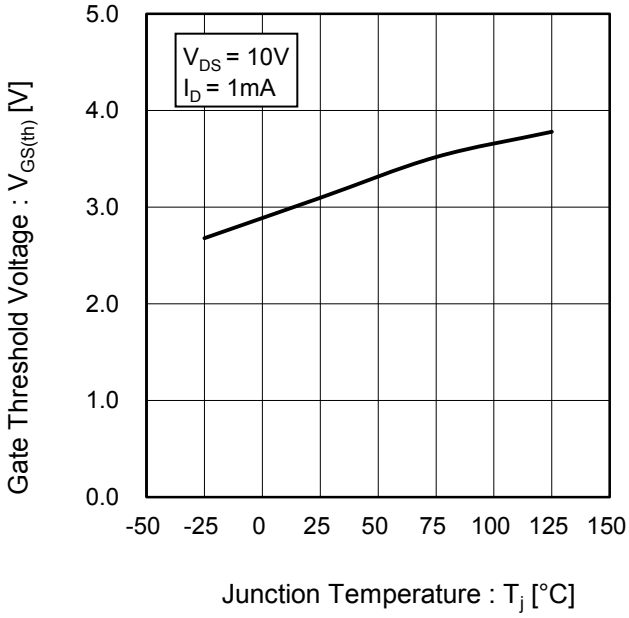


Fig.9 Transconductance vs. Drain Current

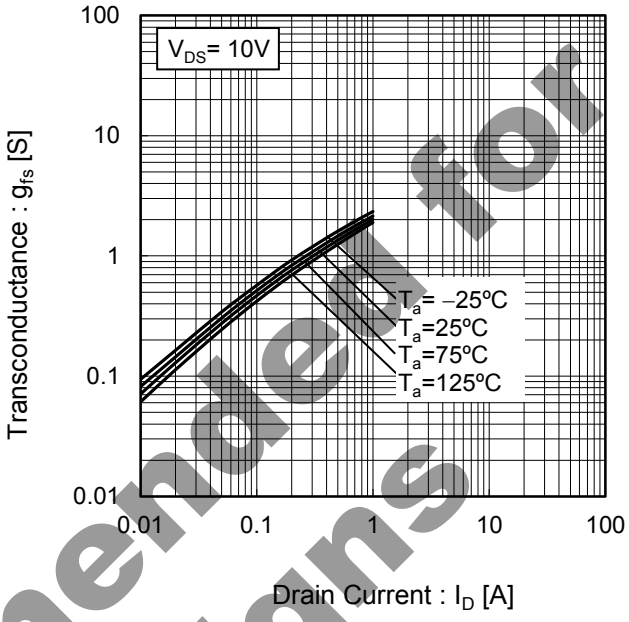
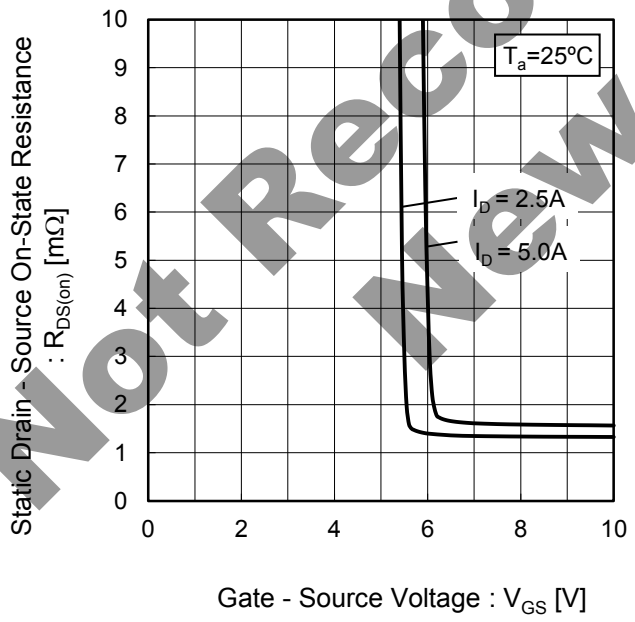


Fig.10 Static Drain - Source On - State Resistance vs. Gate Source Voltage



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Fig.11 Static Drain - Source On - State Resistance vs. Drain Current(II)

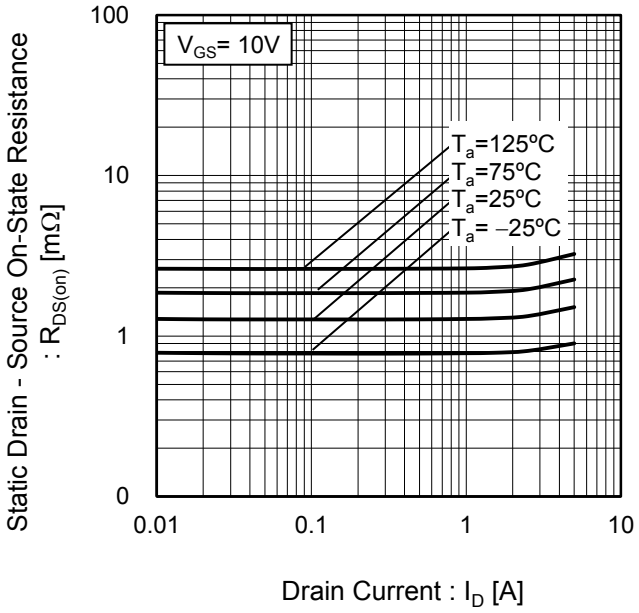
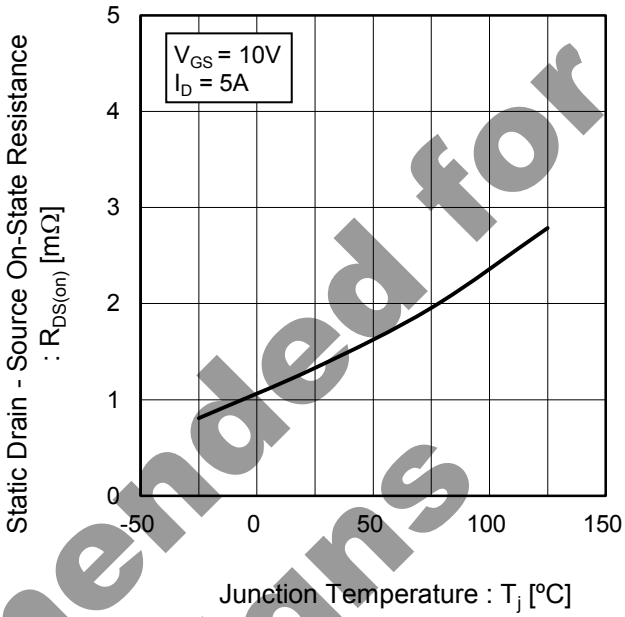


Fig.12 Static Drain - Source On - State Resistance vs. Junction Temperature



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Fig.13 Typical Capacitance vs. Drain - Source Voltage

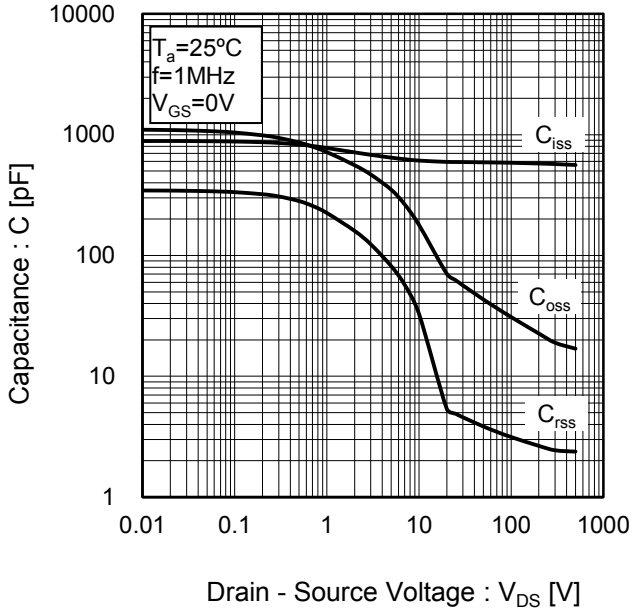


Fig.14 Switching Characteristics

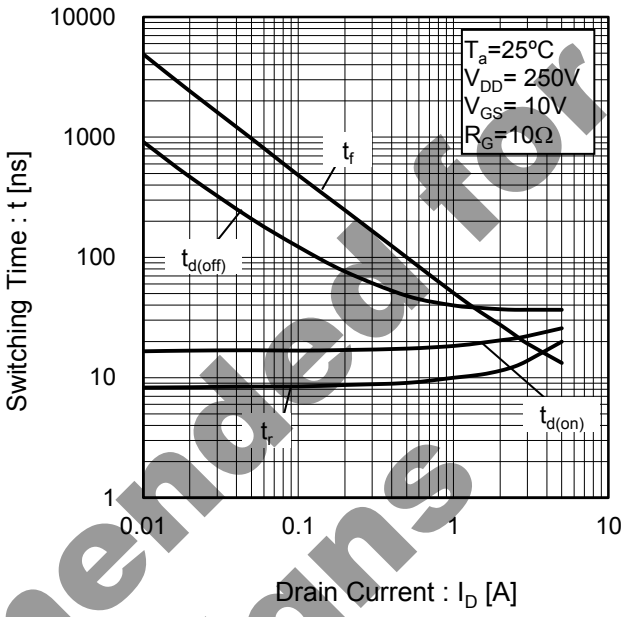


Fig.15 Dynamic Input Characteristics

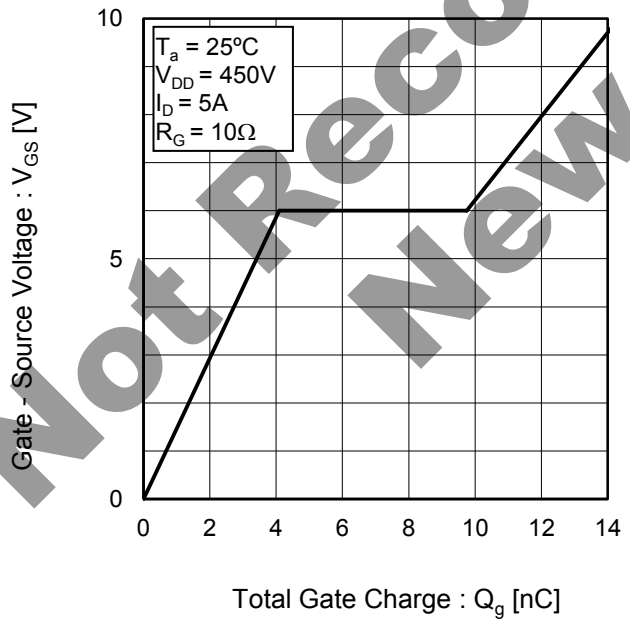
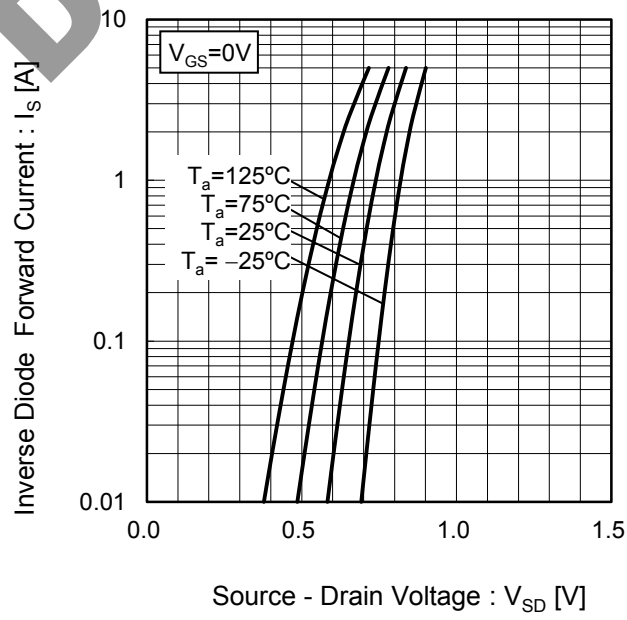


Fig.16 Inverse Diode Forward Current vs. Source - Drain Voltage



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●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

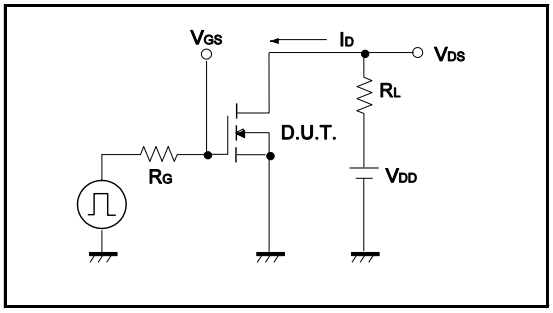


Fig.1-2 Switching Waveforms

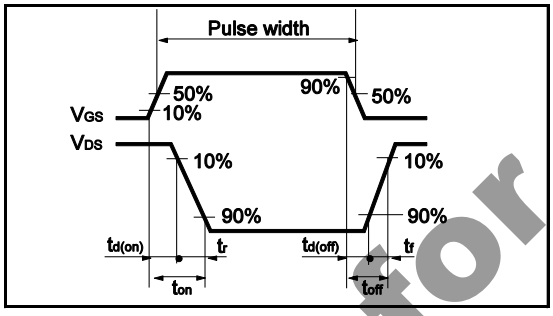


Fig.2-1 Gate Charge Measurement Circuit

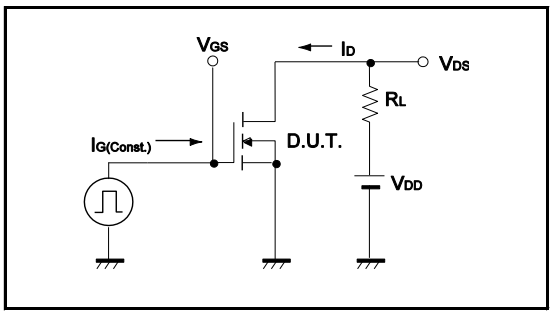
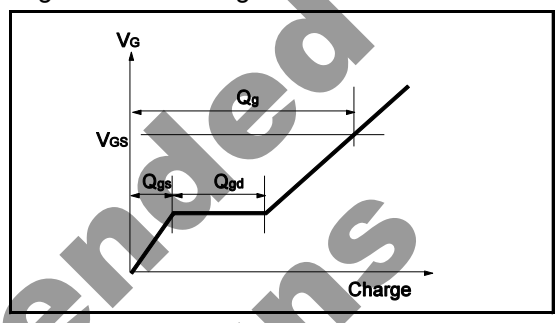


Fig.2-2 Gate Charge Waveform



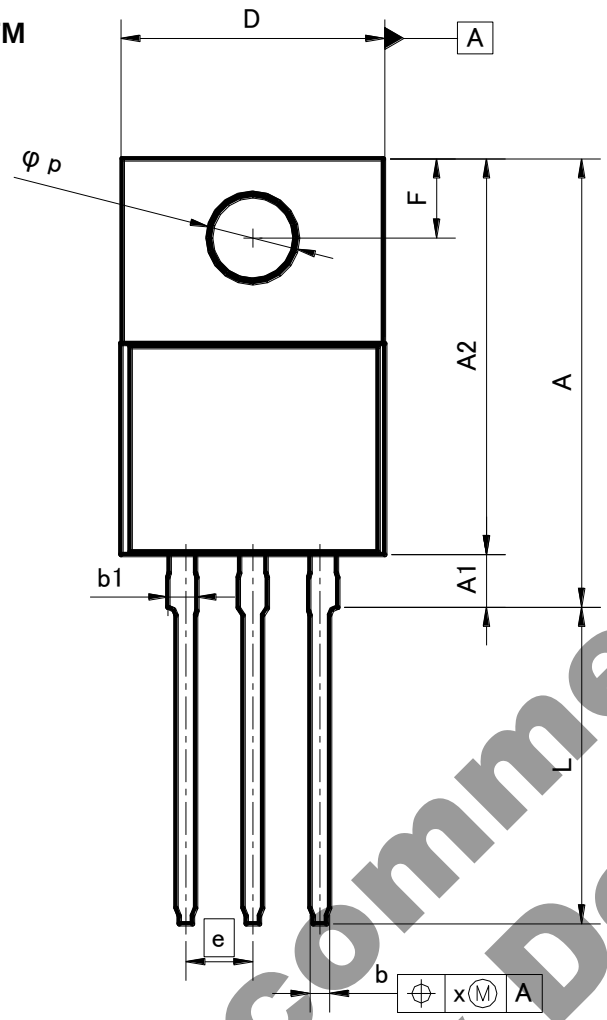
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●**Dimensions** (Unit : mm)

TO-220FM



DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	16.60	17.60	0.654	0.693
A1	1.80	2.20	0.071	0.087
A2	14.80	15.40	0.583	0.606
A4	6.80	7.20	0.268	0.283
b	0.70	0.85	0.028	0.033
b1	1.10	1.50	0.043	0.059
c	0.70	0.85	0.028	0.033
D	9.90	10.30	0.39	0.406
E	4.40	4.80	0.173	0.189
e	2.54		0.10	
E1	2.70	3.00	0.106	0.118
F	2.80	3.20	0.11	0.126
L	11.50	12.50	0.453	0.492
p	3.00	3.40	0.118	0.134
Q	2.10	3.10	0.083	0.122
x	–	0.381	–	0.015

Dimension in mm/inches

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