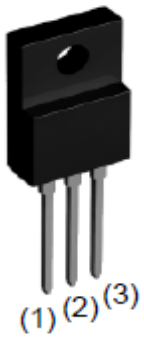
CMS6507AENX

Nch 650V/7A Super Junction Power MOSFET

V_{DSS} T_j = 125℃	700V
V_{DSS} T_j = 25℃	650V
$R_{DS(on)}$ (Max.)	0.78Ω
I_D	7A
P_D	40W

Outline

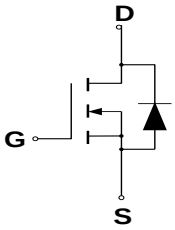
TO-220FP
Front View



FEATURES

- Low on-resistance
- Fast switching speed
- Gate-source voltage (V_{GSS}) guaranteed to be ±20V
- Drive circuits can be simple
- Parallel use is easy
- Pb-free lead plating ; RoHs compliant

Inner circuit



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

Application

- Switching Power Supply

Packaging specificationa

Type	Packaging	Bulk
	Reel size (mm)	-
	Tape width (mm)	-
	Basic ordering unit (pcs)	1,000
	Taping code	-
	Marking	CMS6507A

ORDERING INFORMATION

Part Number	Temperature Range	Package
CMS6507AENX	-55℃ to 150℃	TO-220FP

*Note :

AE*Series

N*:N-ch Mosfet

X*TO-220FP

ABSOLUTE MAXIMUM RATINGS (Ta=25℃)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DSS}	650	V
Continuous drain current	Tc=25℃	I_D *1	±7	A
	Tc=100℃	I_D *1	±3.8	A
Pulsed drain current		$I_{D,\ pulse}$ *2	±14	A
Gate-Source Voltage		V_{GSS}	±20	V
Avalanche energy, single pulse		E_{AS} *3	133	mJ
Avalanche energy, repetitive		E_{AR} *3	0.2	mJ
Avalanche current, repetitive		I_{AR}	1.3	A
Power Dissipation (Tc=25℃)		P_D	40	W
Junction temperature		T_J	150	℃
Range of storage temperature		Tstg	-55 to +150	℃
Reverse diode dv/dt		Dv/dt *4	15	V/ns
Drain-Source Voltage Slope	V_{DS}=480V ; Tj=25℃	Dv/dt	50	V/ns

THERMAL RESISTANCE

Parameter	Symbol	Value			Unit
		Min.	Typ.	Max.	
Thermal resistance , junction-case	R_{thJC}	-	-	3.13	℃/W
Thermal resistance , junction-ambient	R_{thJA}	-	-	70	℃/W
Soldering temperature , wavesoldering for 10s	T_{sold}	-	-	265	℃

ELECTRICAL CHARACTERISTICS (Ta=25℃)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Drain-Source breakdown voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250uA	650	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 600V, V_{GS} = 0V				uA
		T_j = 25℃	-	0.1	100	
		T_j = 125℃	-	-	1000	
Gate-Source leakage current	I_{GSS}	V_{GS} = ±20V, V_{DS} = 0V	-	-	±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} = 10V, I_D = 1mA	2	-	4	V
Static drain-source on-state resistance	$R_{DS(on)}$ *5	V_{GS} = 10V, I_D = 2.4A				Ω
		T_j = 25℃	-	0.6	0.78	
		T_j = 125℃	-	1.20	-	
Gate input resistance	R_G	F = 1MHz, open drain	-	10.6	-	Ω

ELECTRICAL CHARACTERISTICS (Ta=25℃)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Transconductance	G_{fs} *5	V_{DS} = 10V, I_D = 3.5A	1.8	3.6	-	S
Input capacitance	C_{iss}	V_{GS} = 0V V_{DS} = 25V F = 1MHZ	-	390	-	pF
Output capacitance	C_{oss}		-	390	-	
Reverse transfer capacitance	C_{rss}		-	50	-	
Effective output capacitance, energy related	$C_{o(er)}$	V_{GS} = 0V V_{DS} = 0V to 480V	-	21	-	pF
Effective output capacitance, time related	$C_{o(tr)}$		-	88	-	
Turn-on delay time	$T_{d(on)}$ *5	V_{DD}～300V, V_{GS} = 10V I_D = 3.5A R_L = 86.6Ω R_G = 10Ω	-	25	-	ns
Rise time	T_r *5		-	25	-	
Turn-off delay time	$T_{d(off)}$ *5		-	70	-	
Fall time	T_f *5		-	35	-	

GATE CHARACTERISTICS (Ta=25℃)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Gate plateau voltage	V(plateau)	V_{DD}～300V, I_D = 7A	-	6.2	-	V
Total gate charge	Q_g *5	V_{DD}～300V I_D = 7A V_{GS} = 10V	-	20	-	nC
Gate-Source charge	Q_{gs} *5		-	3	-	
Gate Drain charge	Q_{gd} *5		-	11	-	

*1 : Limit only by maximum temperature allowed

*2 : Pw≦10us, Duty cycle≦1%

*3 : I_D = 1.3A, V_{DD} = 50V

*4 : Reference measurement circuits Fig.5-1

*5 : Pulsed

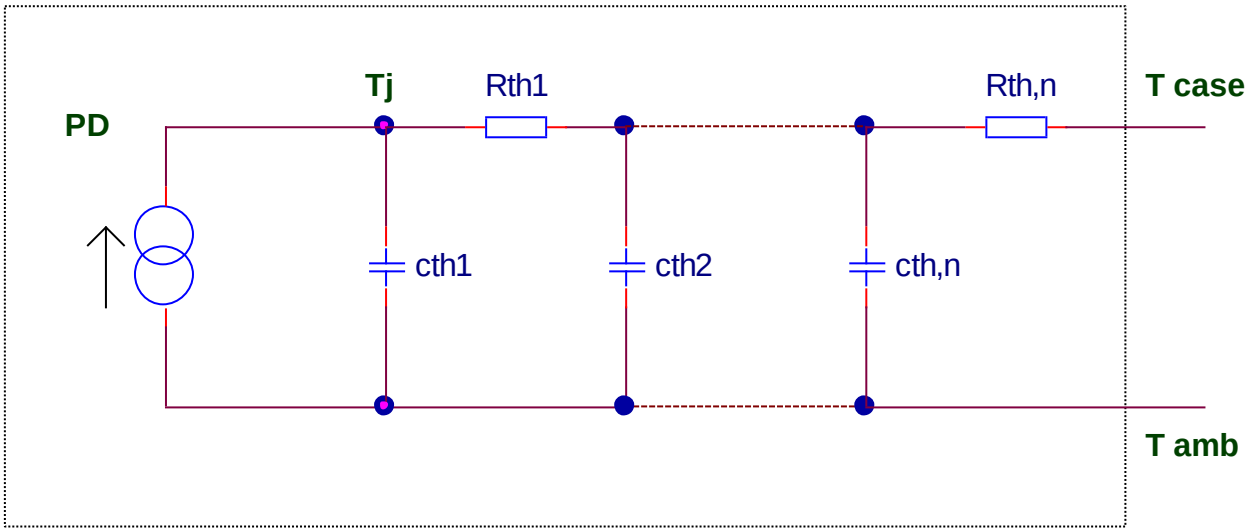
BODY DIODE ELECTRICAL CHARACTERISTICS (Source-Drain) (Ta=25℃)

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Inverse diode continuous, forward current	I_S *1	Tc=25℃	-	-	7	A
Inverse diode direct current, pulsed	I_{SM} *2		-	-	14	A
Forward Voltage	V_{SD} *5	V_{GS} = 0V, I_S = 7A	-	-	1.5	V
Reverse recovery time	T_{rr} *5	I_S = 7A Di/dt = 100A/us	-	340	-	ns
Reverse recovery charge	Q_{rr} *5		-	2.8	-	uC
Peak reverse recovery current	I_{rrm} *5		-	17	-	A

TYPICAL TRANSIENT THERMAL CHARACTERISTICS

Symbol	Value	Unit
R_{th1}	0.385	K/W
R_{th2}	1.24	
R_{th3}	2.2	
C_{th1}	0.00128	Ws/K
C_{th2}	0.013	
C_{th3}	0.448	

Application Circuit



●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

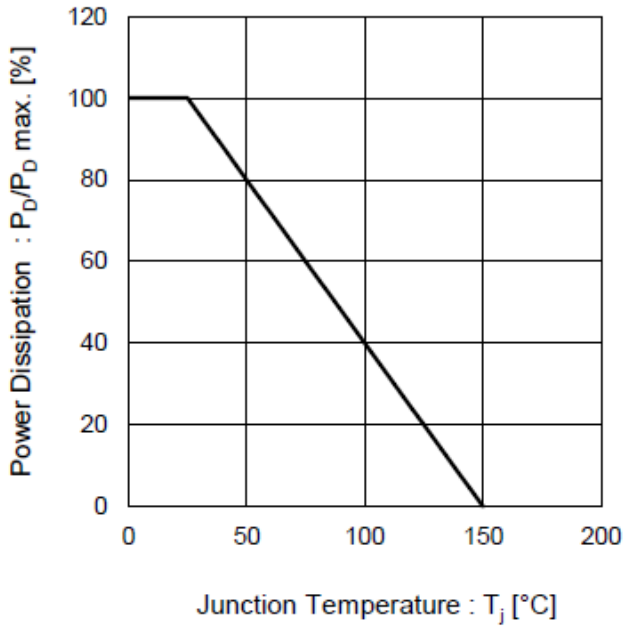


Fig.2 Normalized Transient Thermal Resistance vs. Pulse Width

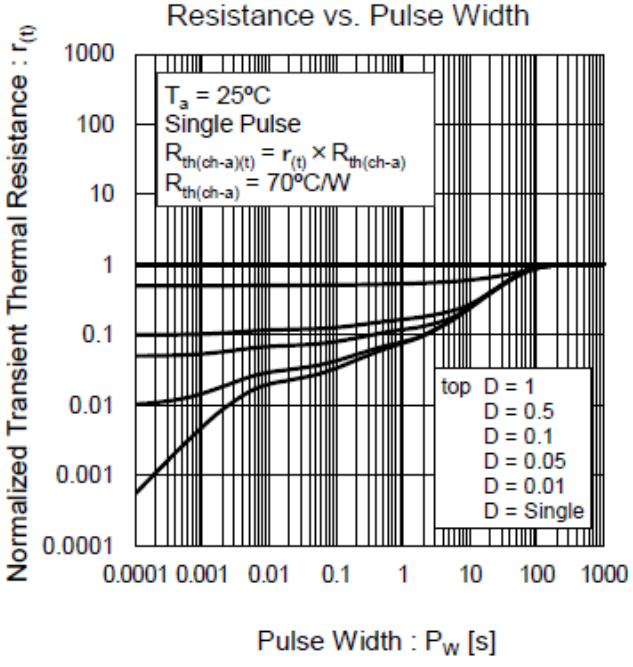
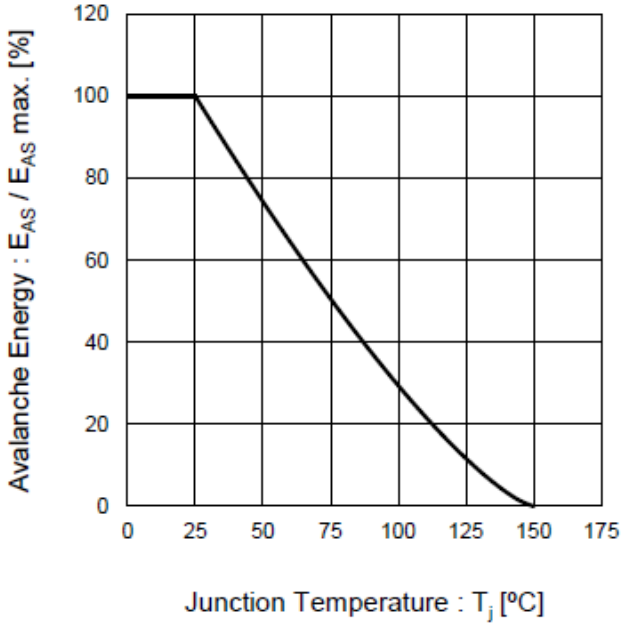


Fig.3 Avalanche Energy Derating Curve vs Junction Temperature



●Electrical characteristic curves

Fig.4 Typical Output Characteristics(I)

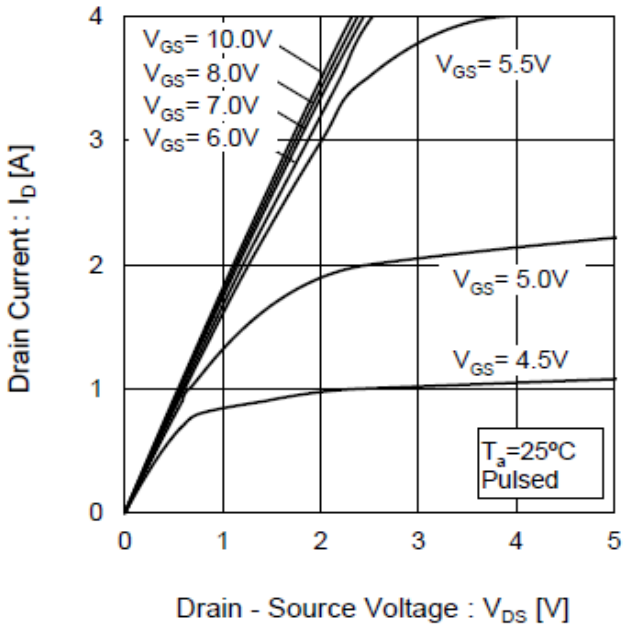


Fig.5 Typical Output Characteristics(II)

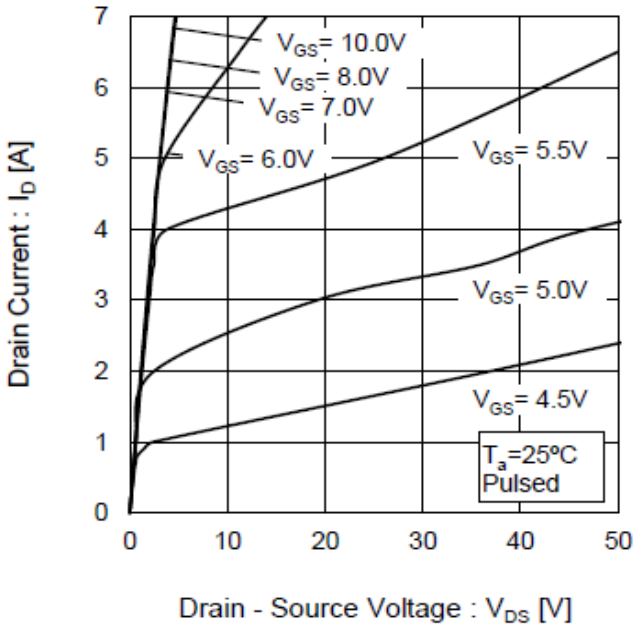


Fig.6 T_j = 150°C Typical Output Characteristics(I)

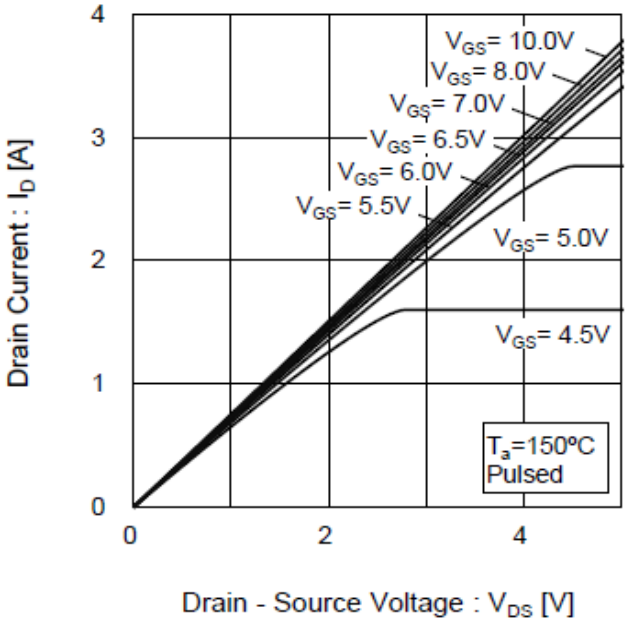
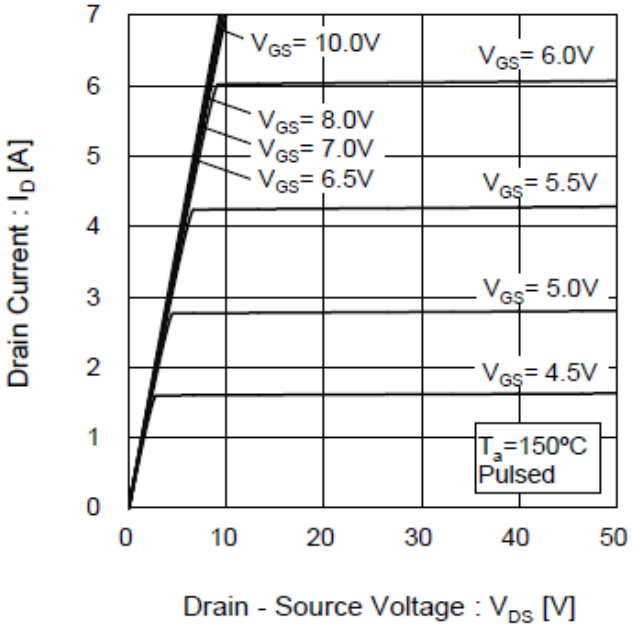


Fig.7 T_j = 150°C Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.8 Breakdown Voltage vs. Junction Temperature

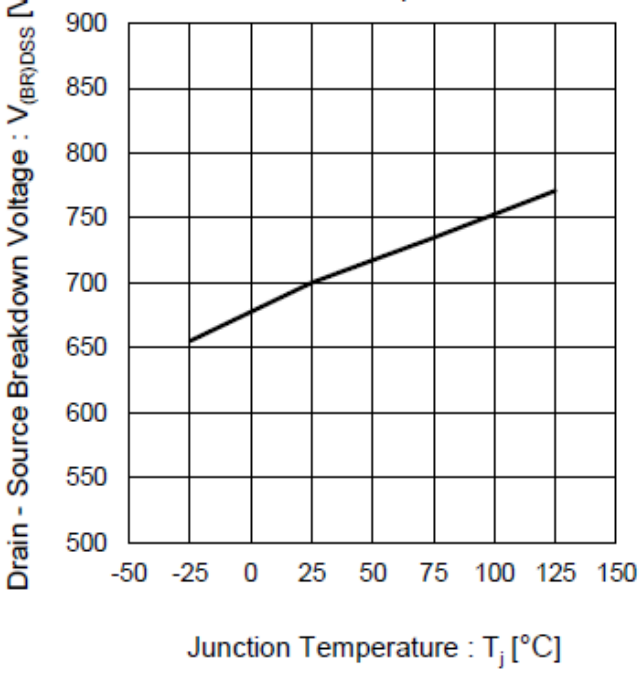


Fig.9 Typical Transfer Characteristics

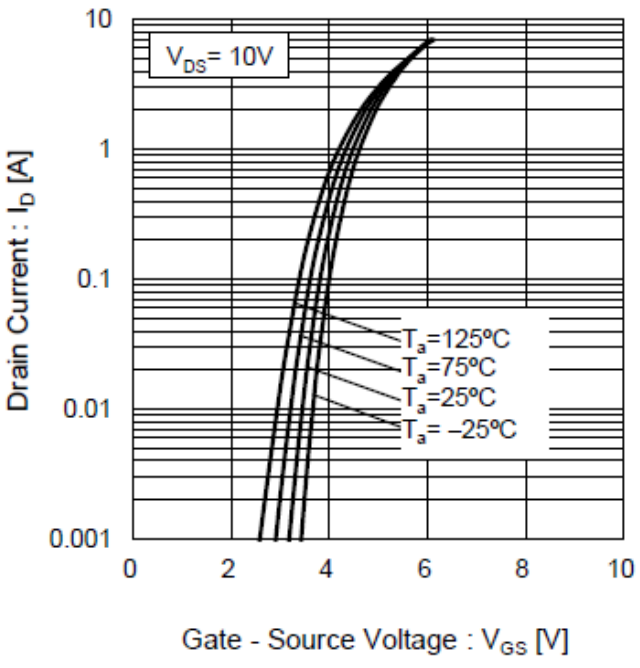


Fig.10 Gate Threshold Voltage vs. Junction Temperature

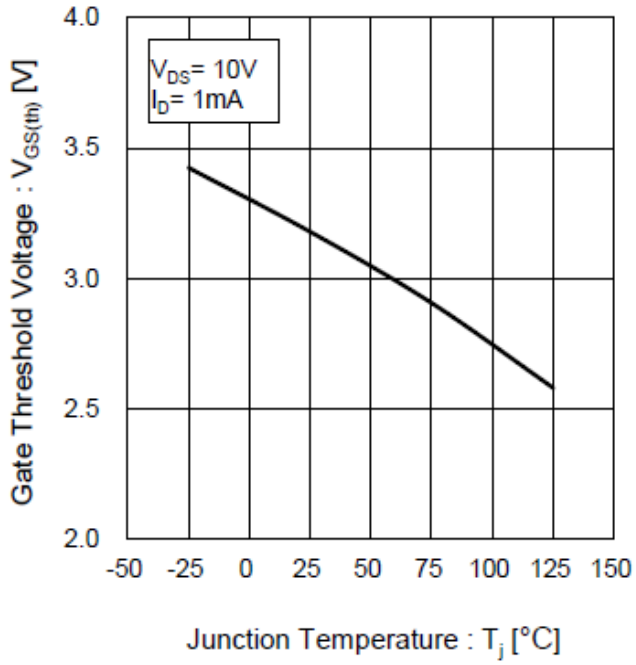
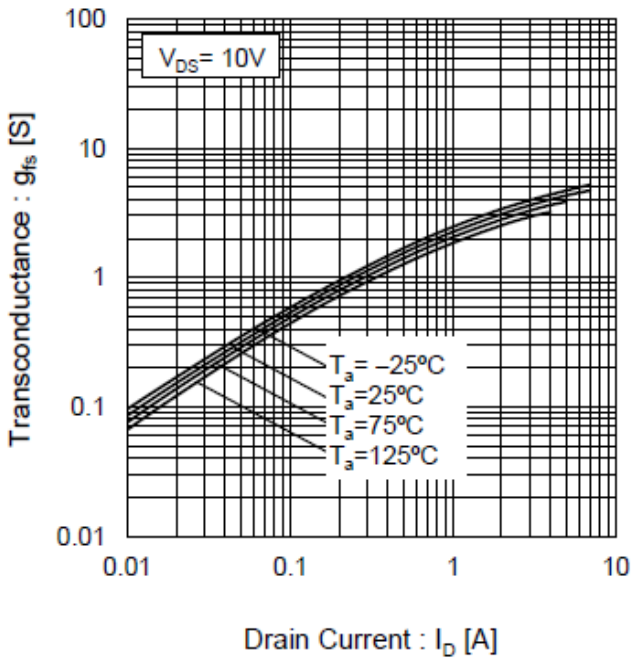


Fig.11 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.12 Static Drain - Source On - State Resistance vs. Gate Source Voltage

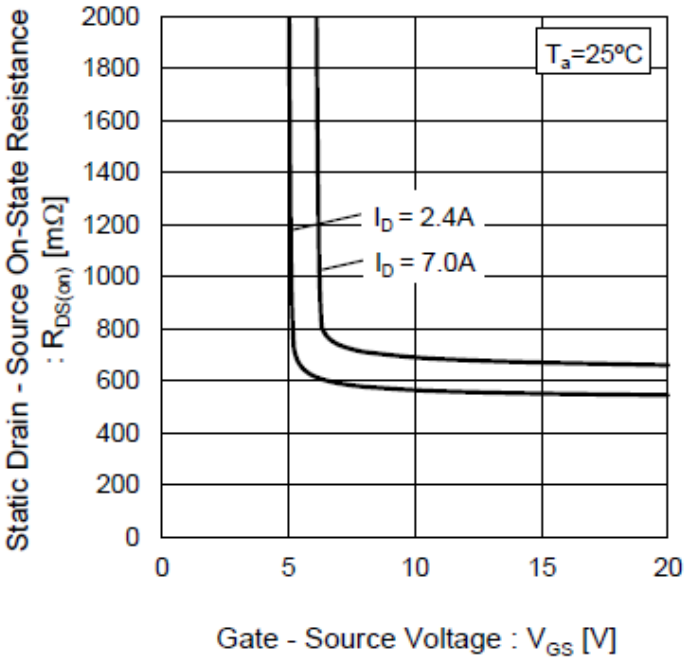


Fig.13 Static Drain - Source On - State Resistance vs. Junction Temperature

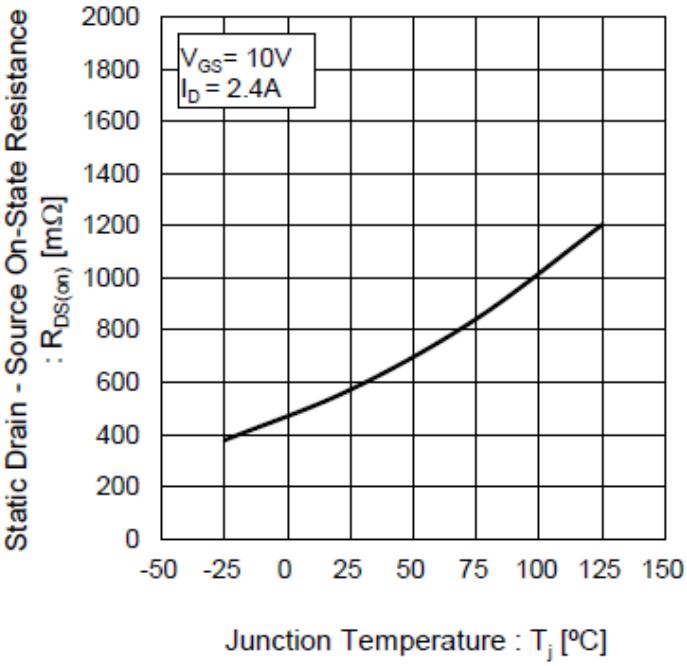


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current

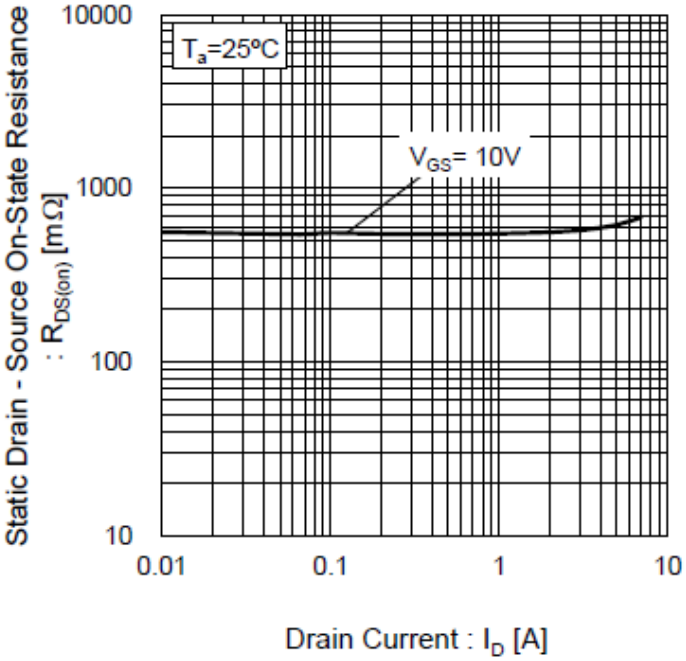
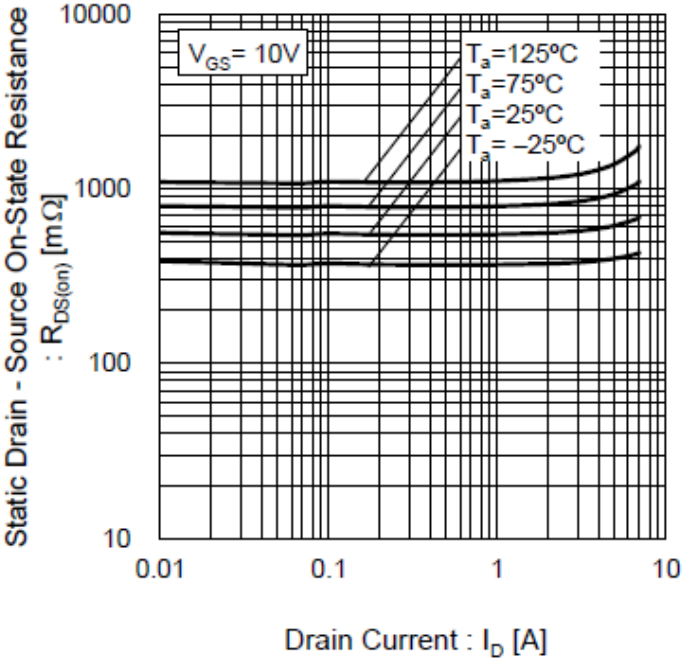


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current



●Electrical characteristic curves

Fig.16 Typical Capacitance vs. Drain - Source Voltage

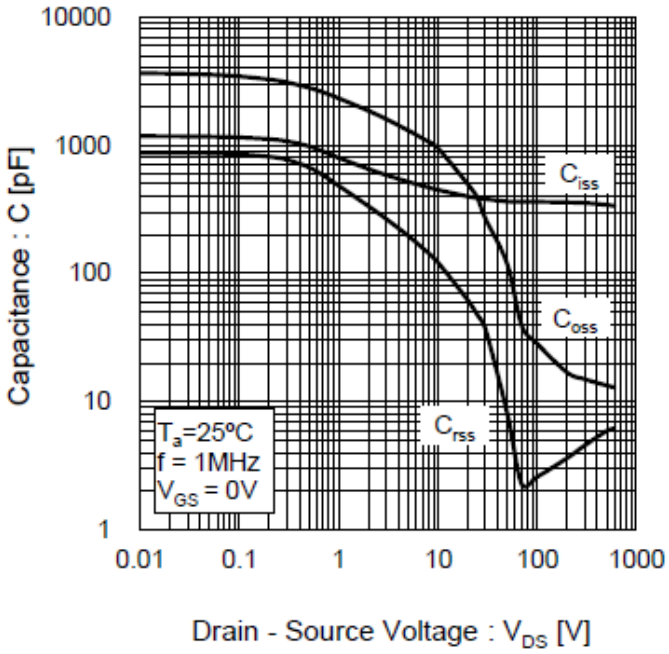


Fig.17 Coss Stored Energy

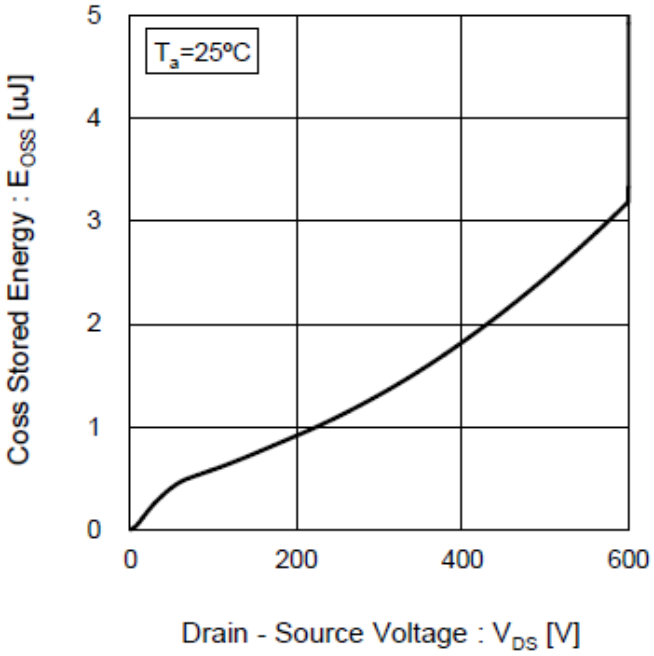


Fig.18 Switching Characteristics

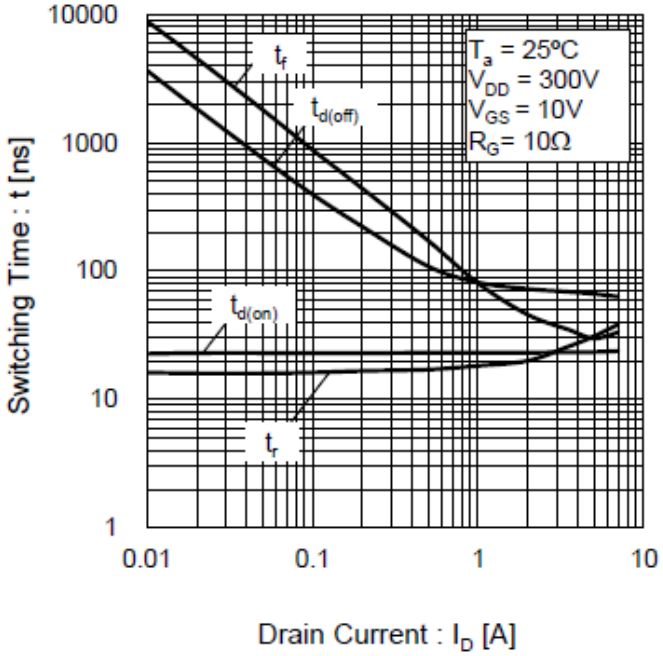
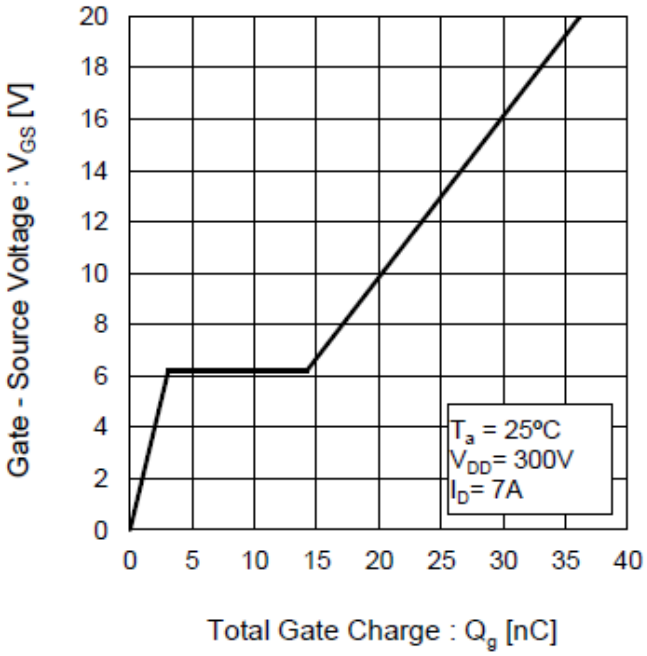


Fig.19 Dynamic Input Characteristics



●Electrical characteristic curves

Fig.20 Inverse Diode Forward Current vs. Source - Drain Voltage

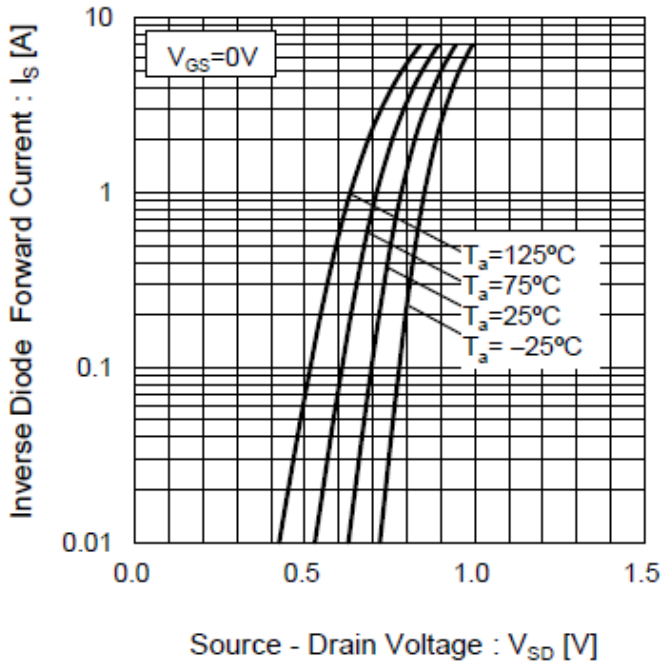
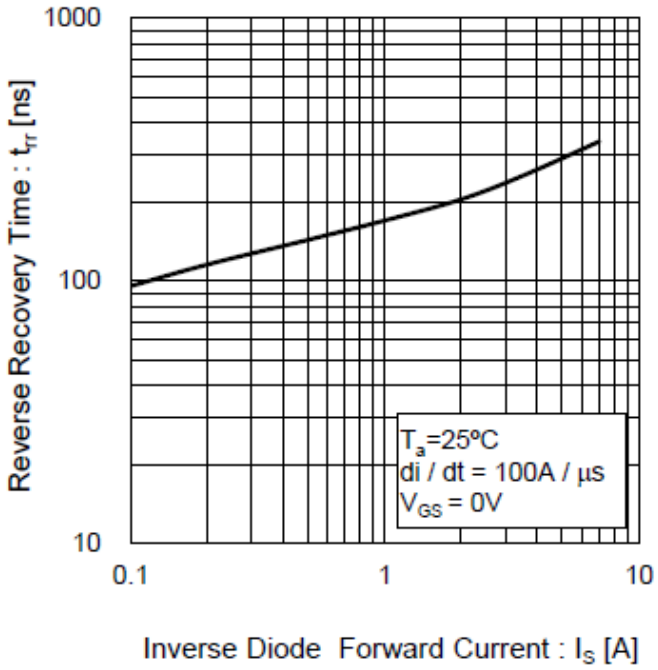
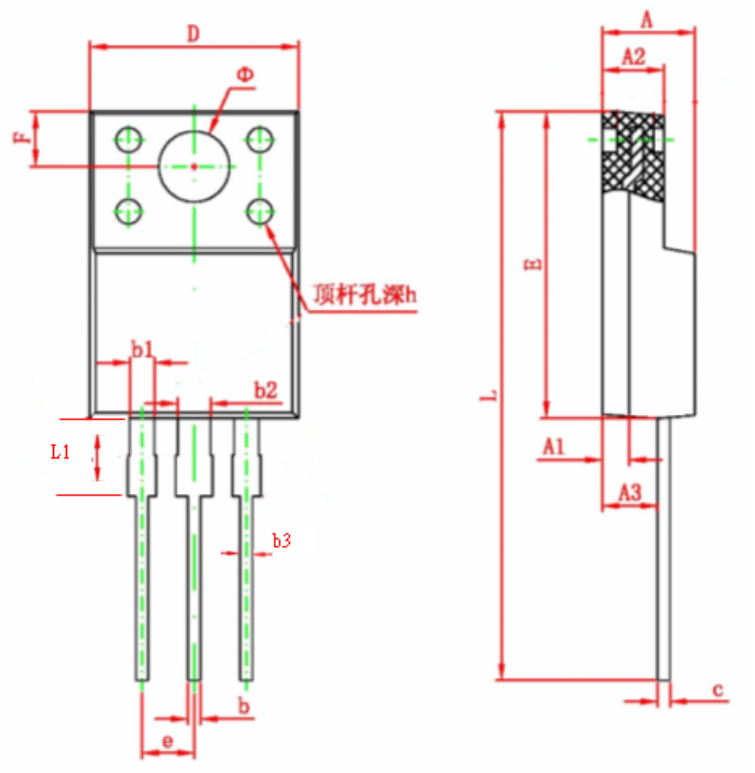


Fig.21 Reverse Recovery Time vs.Inverse Diode Forward Current



PACKAGE DIMENSION

TO-220F



Symbol	Dimensions In Millimeters	
	Min.	Max
A	3.80	4.70
A1	1.3 REF.	
A2	2.20	3.20
A3	2.10	3.20
b	0.30	0.95
b1	1.00	1.75
b2	1.00	1.75
b3	0.50	0.80
c	0.30	0.90
D	9.90	10.40
E	14.60	16.20
e	2.54 TYP.	
F	3.00 REF.	
Φ	3.50 REF.	
h	0.00	0.30
L	28.00	30.00
L1	3.20	3.55

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