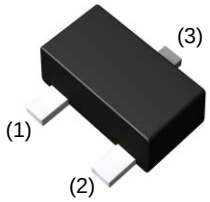
RE1C002UN

Nch 20V 200mA Small Signal MOSFET Datasheet

V_{DSS}	20V
$R_{DS(on)}$ (Max.)	1.2Ω
I_D	200mA
P_D	150mW

●Outline

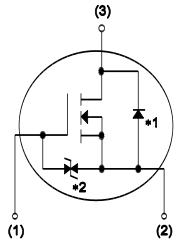
EMT3F
SOT-416FL



●Features

1) Low voltage drive(1.2V) makes this device ideal for partable equipment.
2) Drive circuits can be simple.
3) Built-in G-S Protection Diode.

●Inner circuit



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

∗1 BODY DIODE
∗2 ESD PROTECTION DIODE

●Application

Switching

●Packaging specifications

Type	Packaging	Taping
	Reel size (mm)	180
	Tape width (mm)	8
	Basic ordering unit (pcs)	3,000
	Taping code	TL
	Marking	QR

●Absolute maximum ratings(T_a = 25°C)

Parameter	Symbol	Value	Unit
Drain - Source voltage	V_{DSS}	20	V
Continuous drain current	I_D *1	±200	mA
Pulsed drain current	$I_{D,pulse}$ *2	±400	mA
Gate - Source voltage	V_{GSS}	±8	V
Power dissipation	P_D *3	150	mW
Junction temperature	T_j	150	°C
Range of storage temperature	T_{stg}	−55 to +150	°C

●Thermal resistance

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Thermal resistance, junction - ambient	R_{thJA} *3	-	-	833	°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	20	-	-	V
Zero gate voltage drain current	I_{DSS}	V_{DS} = 20V, V_{GS} = 0V	-	-	1	μA
Gate - Source leakage current	I_{GSS}	V_{GS} = ±8V, V_{DS} = 0V	-	-	±10	μA
Gate threshold voltage	$V_{GS\ (th)}$	V_{DS} = 10V, I_D = 1mA	0.3	-	1.0	V
Static drain - source on - state resistance	$R_{DS(on)}$ *4	V_{GS}=2.5V, I_D=100mA	-	0.8	1.2	Ω
		V_{GS}=1.8V, I_D=100mA	-	1.0	1.4	
		V_{GS}=1.5V, I_D=40mA	-	1.2	2.4	
		V_{GS}=1.2V, I_D=20mA	-	1.6	4.8	
		V_{GS}=2.5V, I_D=100mA, T_j=125°C	-	1.2	1.7	
Transconductance	g_{fs} *4	V_{DS}=10V, I_D=200mA	400	-	-	mS

*1 Limited only by maximum temperature allowed.

*2 Pw ≤ 10μs, Duty cycle ≤ 1%

*3 Each therminal mounted on a recommended land

*4 Pulsed

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Input capacitance	C_{iss}	V_{GS} = 0V	-	25	-	pF
Output capacitance	C_{oss}	V_{DS} = 10V	-	10	-	
Reverse transfer capacitance	C_{rss}	f = 1MHz	-	10	-	
Turn - on delay time	$t_{d(on)}$ *4	$V_{DD} \simeq$ 10V, V_{GS} = 4.0V	-	5	-	ns
Rise time	t_r *4	I_D = 150mA	-	10	-	
Turn - off delay time	$t_{d(off)}$ *4	R_L = 68Ω	-	15	-	
Fall time	t_f *4	R_G = 10Ω	-	10	-	

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

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Forward voltage	V_{SD} *4	V_{GS} = 0V, I_s = 100mA	-	-	1.2	V

●Electrical characteristic curves

Fig.1 Power Dissipation Derating Curve

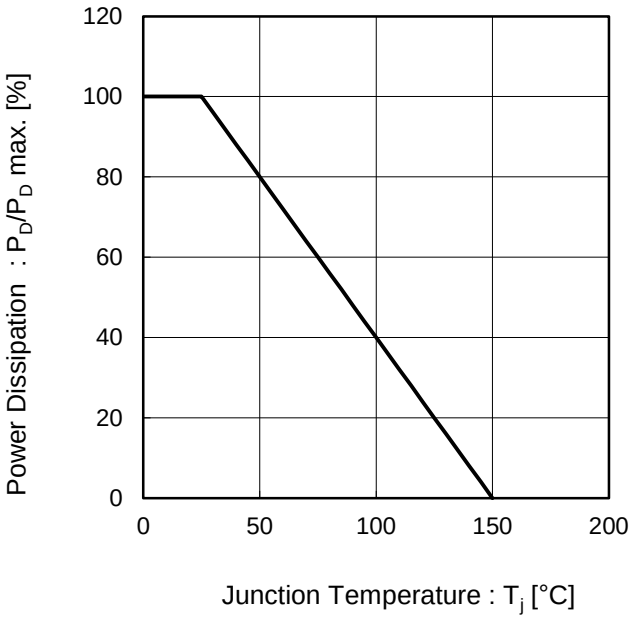


Fig.2 Drain Current Derating Curve

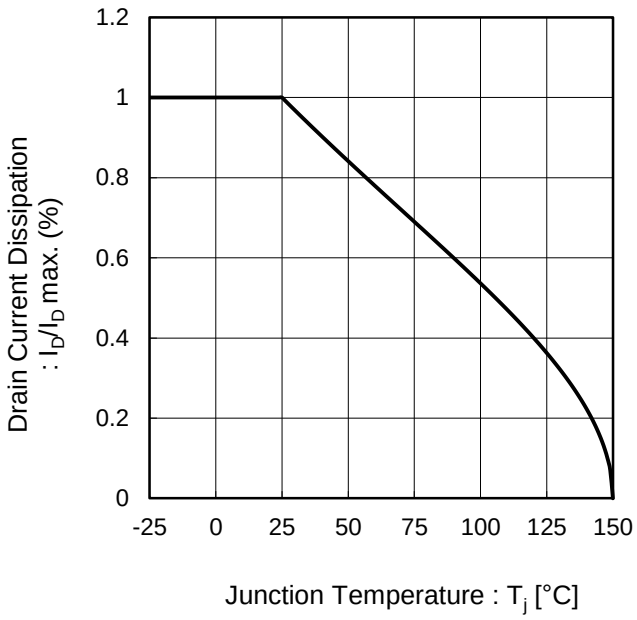


Fig.3 Typical Output Characteristics(I)

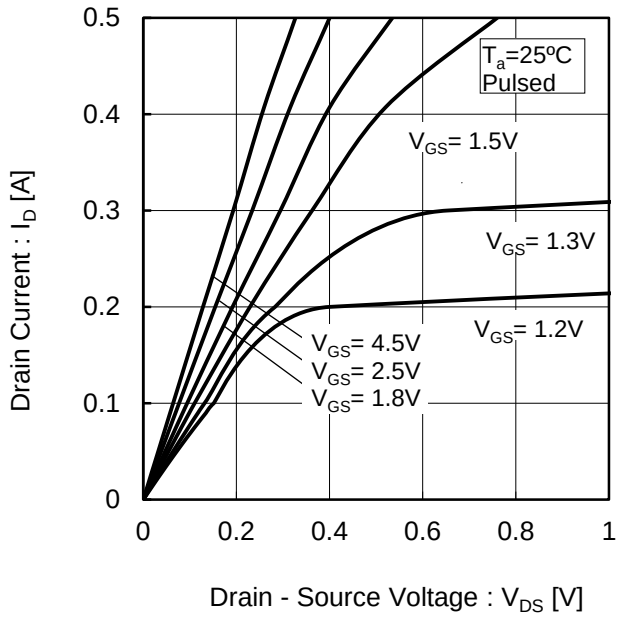
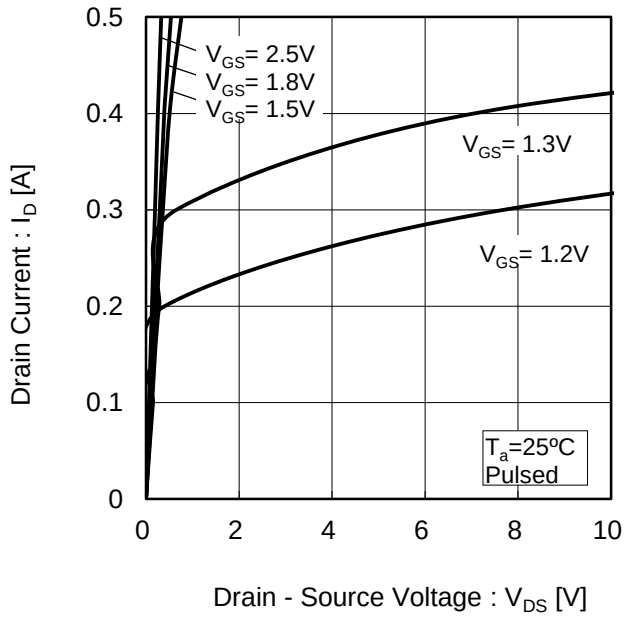


Fig.4 Typical Output Characteristics(II)



●Electrical characteristic curves

Fig.5 Breakdown Voltage vs. Junction Temperature

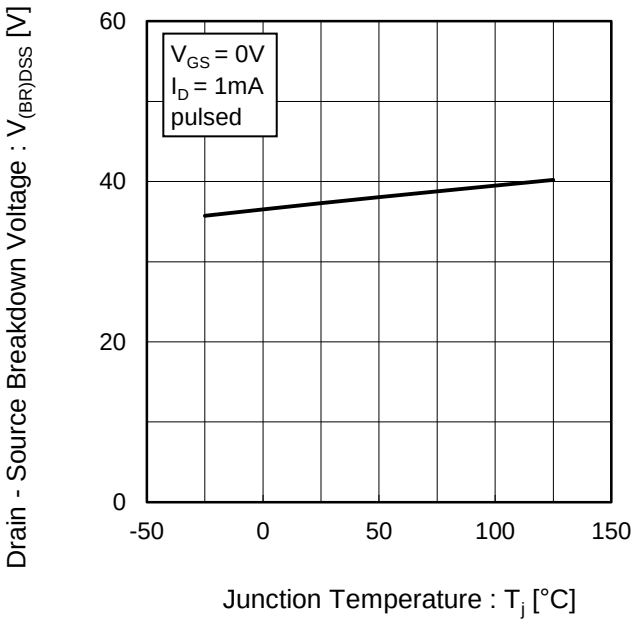


Fig.6 Typical Transfer Characteristics

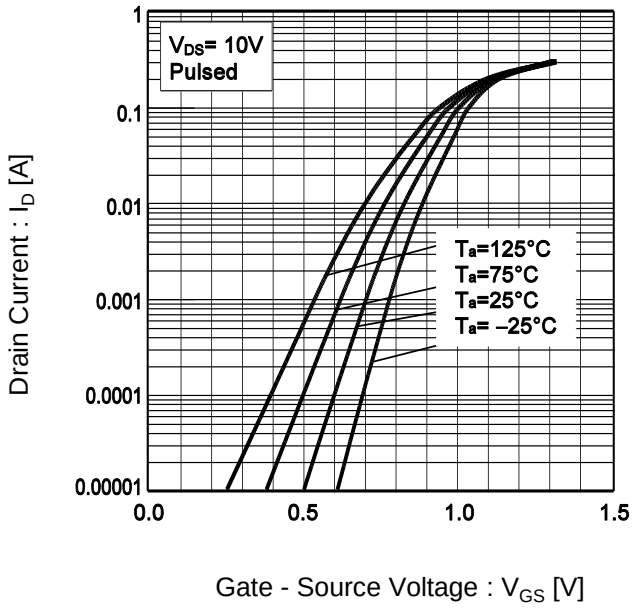


Fig.7 Gate Threshold Voltage vs. Junction Temperature

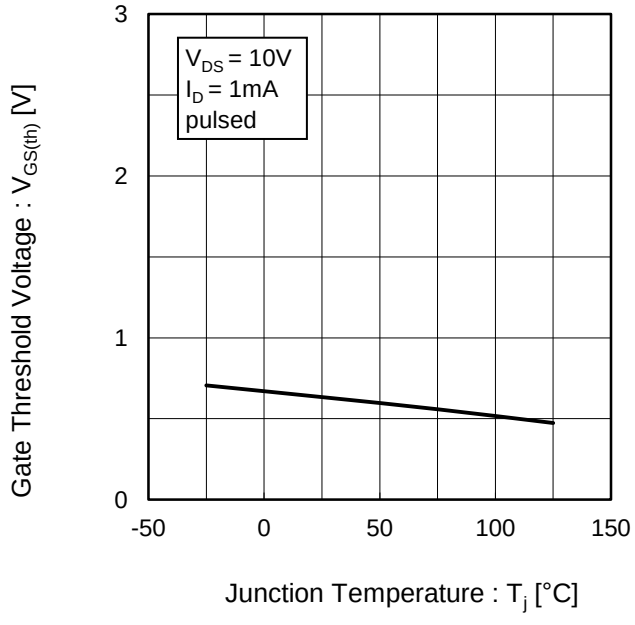
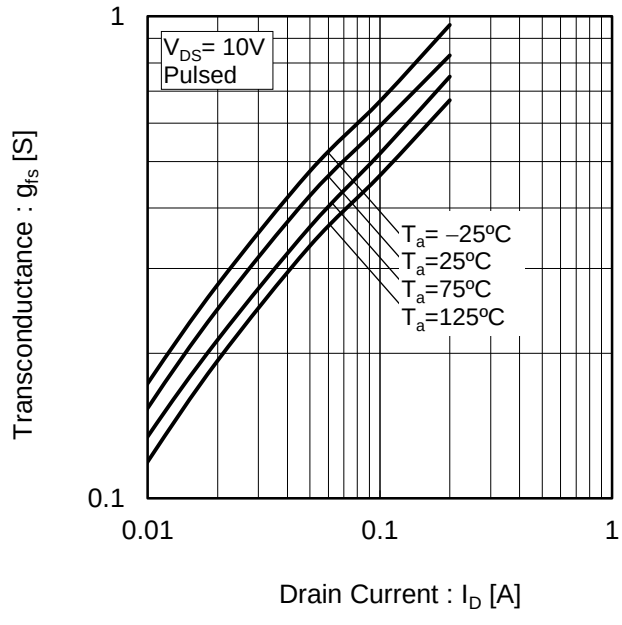


Fig.8 Transconductance vs. Drain Current



●Electrical characteristic curves

Fig.9 Static Drain - Source On - State Resistance vs. Gate Source Voltage

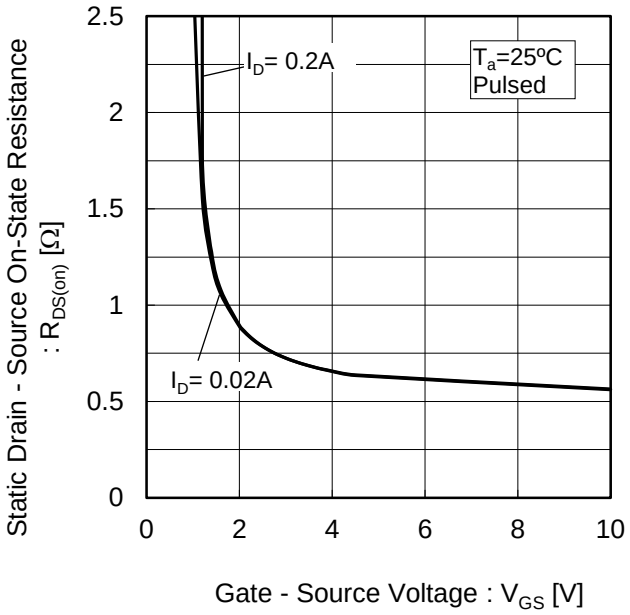


Fig.10 Static Drain - Source On - State Resistance vs. Drain Current(I)

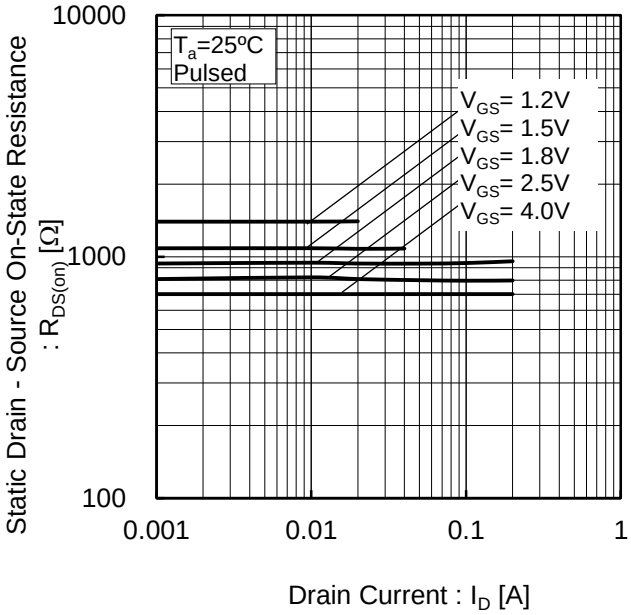
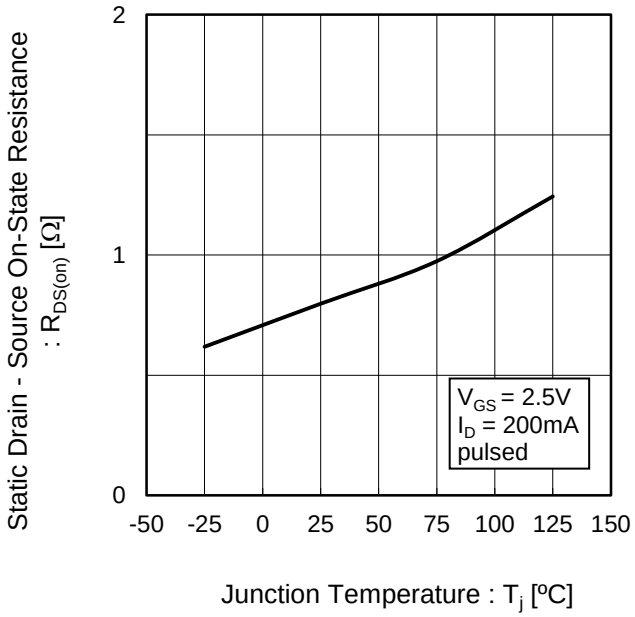


Fig.11 Static Drain - Source On - State Resistance vs. Junction Temperature



●Electrical characteristic curves

Fig.12 Static Drain-Source On-State Resistance vs. Drain Current(II)

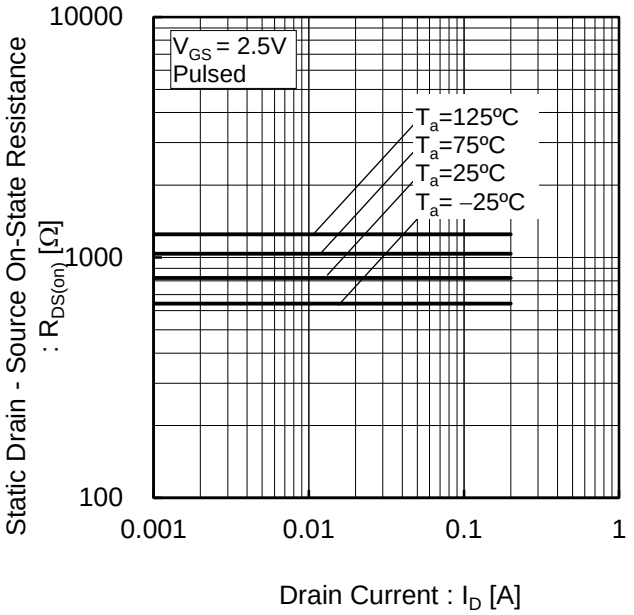


Fig.13 Static Drain - Source On - State Resistance vs. Drain Current(III)

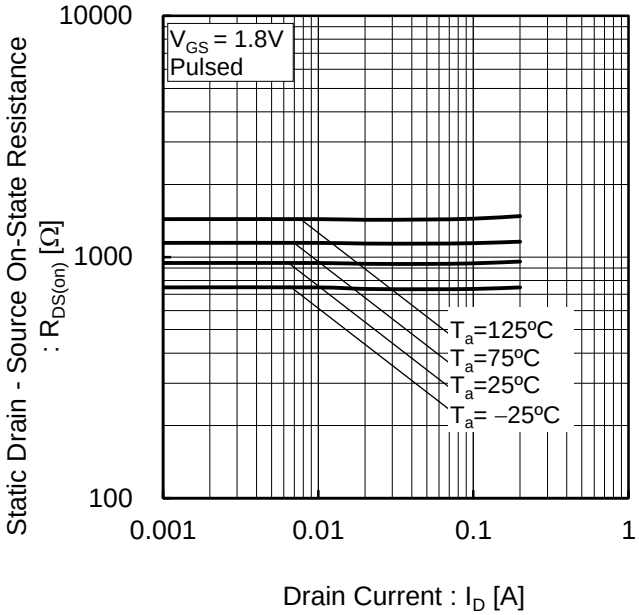


Fig.14 Static Drain - Source On - State Resistance vs. Drain Current(IV)

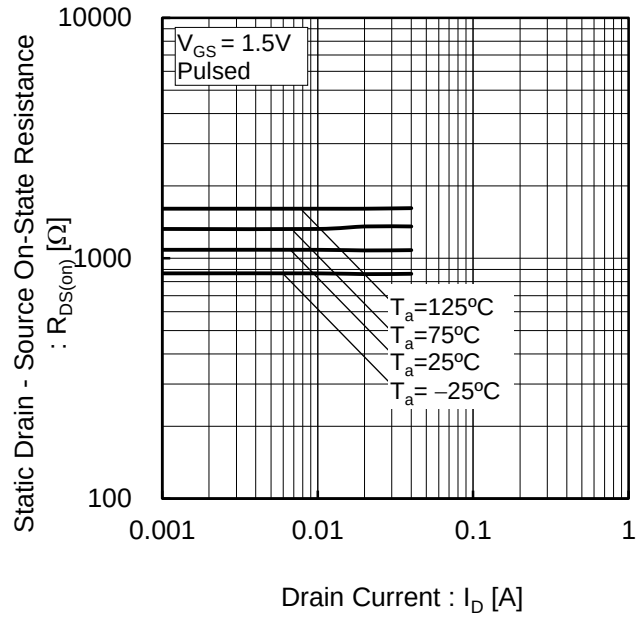
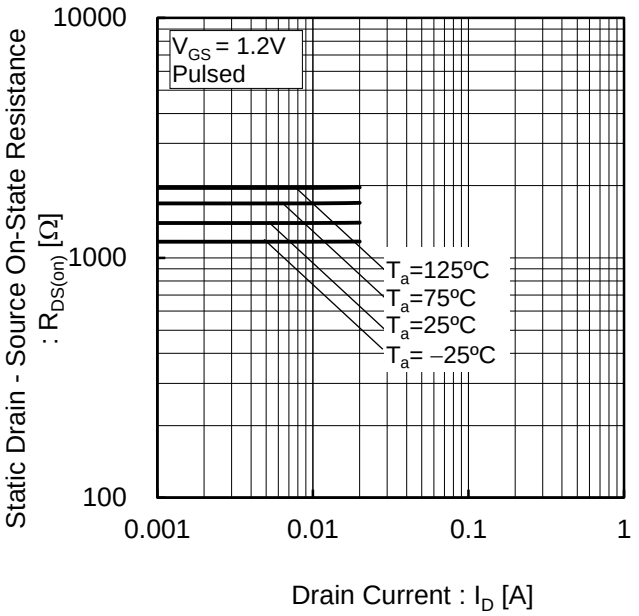


Fig.15 Static Drain - Source On - State Resistance vs. Drain Current(V)



●Electrical characteristic curves

Fig.16 Typical Capacitance vs. Drain - Source Voltage

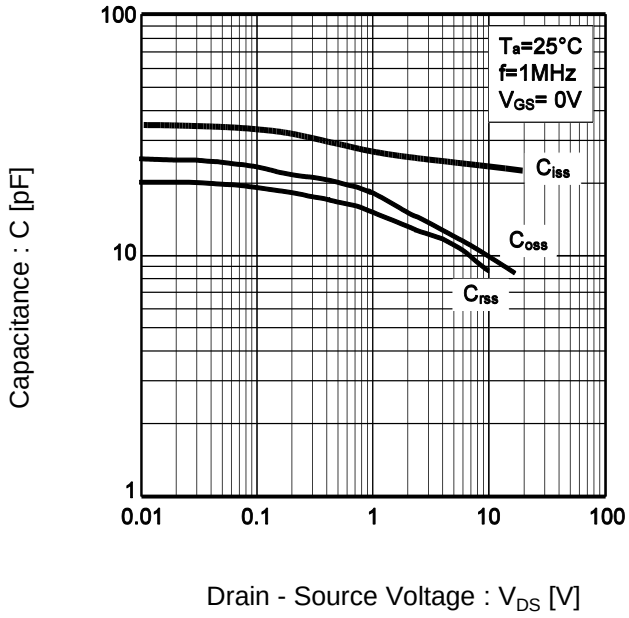


Fig.17 Switching Characteristics

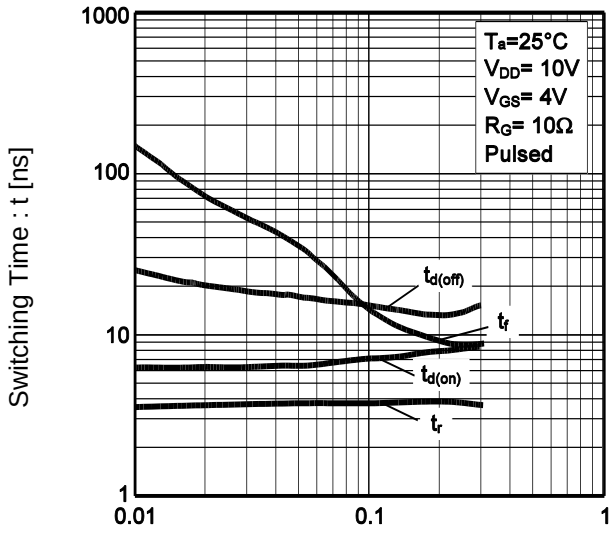
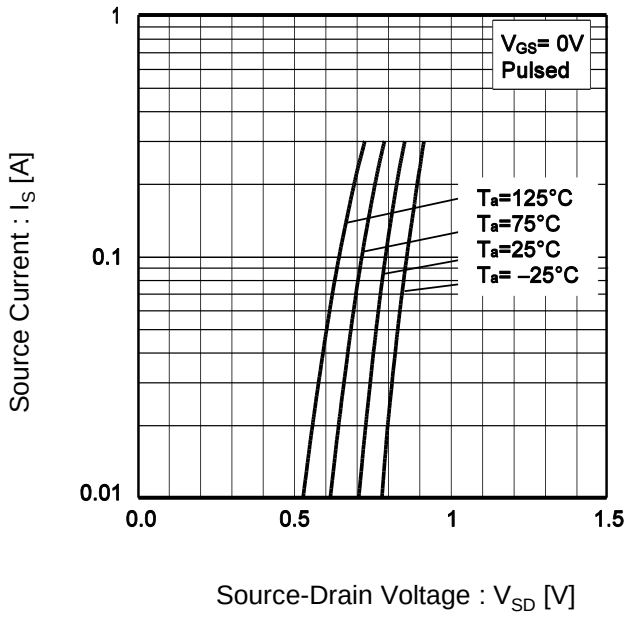


Fig.18 Source Current vs. Source Drain Voltage



●Measurement circuits

Fig.1-1 Switching Time Measurement Circuit

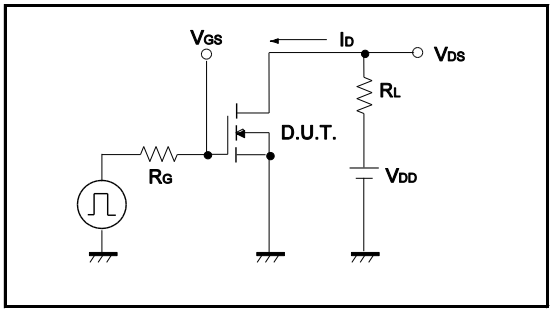
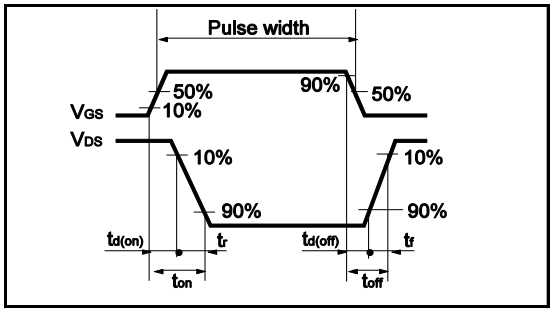
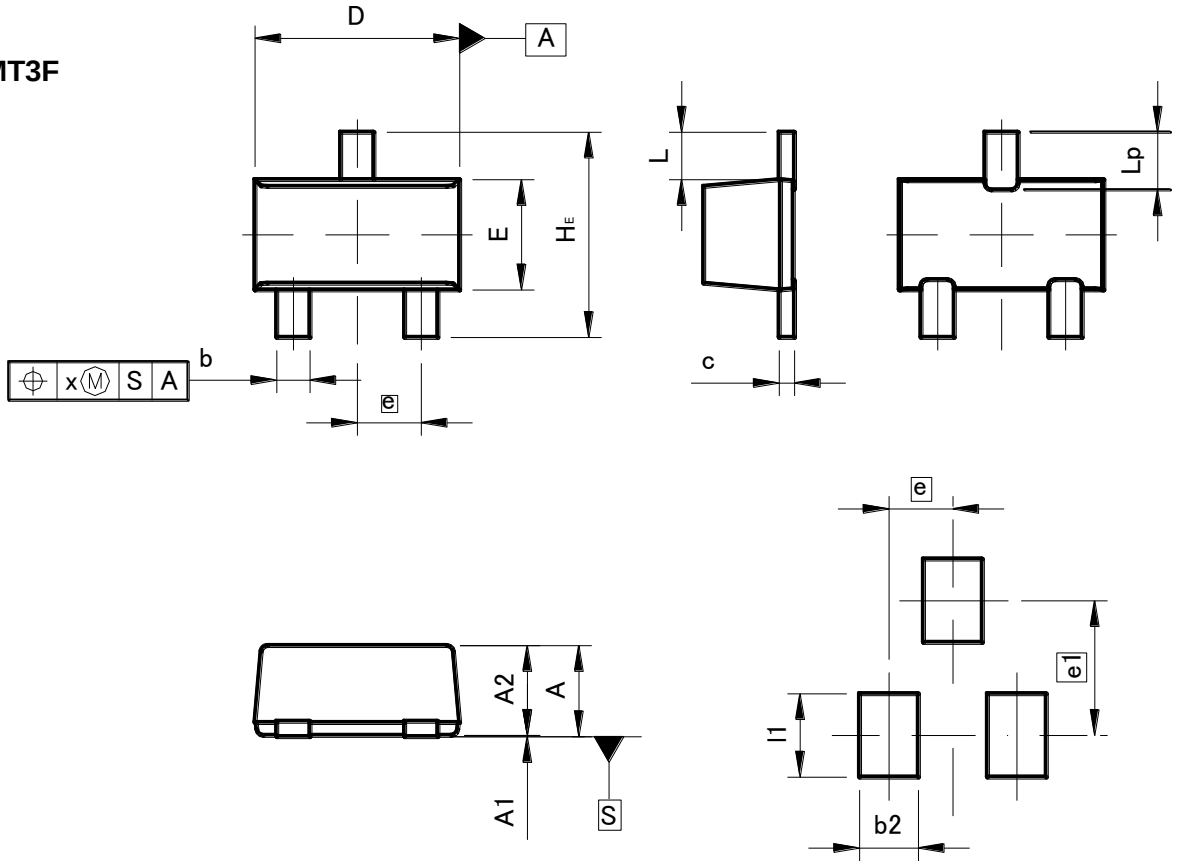


Fig.1-2 Switching Waveforms



●**Dimensions** (Unit : mm)

EMT3F



Patterm of terminal position areas

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.65	0.85		
A1	0.00	0.10	0	0.004
A2	0.60	0.80	0.024	0.031
b	0.21	0.36	0.008	0.014
c	0.08	0.18	0.003	0.007
D	1.50	1.70	0.059	0.067
E	0.76	0.96	0.03	0.038
e	0.50		0.02	
HE	1.50	1.70	0.059	0.067
L	0.37		0.015	
Lp	0.35	0.55	0.014	0.022
x	−	0.10	−	0.004

DIM	MILIMETERS		INCHES	
	MIN	MAX	MIN	MAX
e1	−	1.05	−	0.041
b2	−	0.46	−	0.018
l1	−	0.65	−	0.026

Dimension in mm/inches

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