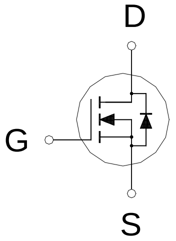
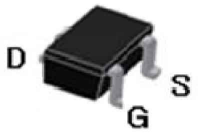
N-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

BV_{DSS}	30V
R_{DSON} (MAX.)	50mΩ
I_D	2.2A





Pb-Free Lead Plating & Halogen Free

ABSOLUTE MAXIMUM RATINGS (T_A = 25 °C Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNIT
Gate-Source Voltage		V_{GS}	±12	V
Continuous Drain Current	T_A = 25 °C	I_D	2.2	A
	T_A = 70 °C		1.65	
Pulsed Drain Current[1]		I_{DM}	14	
Power Dissipation	T_A = 25 °C	P_D	0.29	W
	T_A = 70 °C		0.19	
Operating Junction & Storage Temperature Range		T_j, T_{stg}	-55 to 150	°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNIT
Junction-to-Ambient	$R_{\theta JA}$		425	°C / W
Junction-to-Lead	$R_{\theta JL}$		320	

[1] Pulse width limited by maximum junction temperature.

[2] Duty cycle ≤ 1%

ELECTRICAL CHARACTERISTICS (T_A = 25 °C, Unless Otherwise Noted)

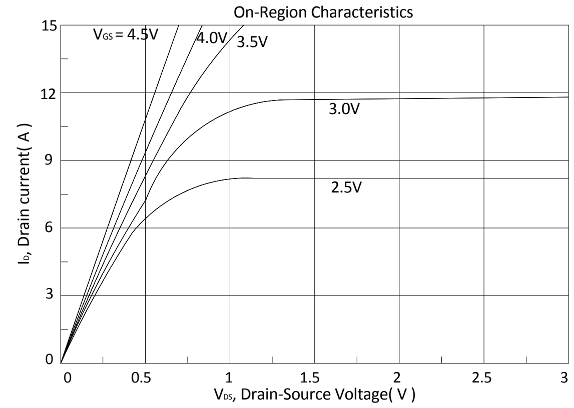
PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250µA	30			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250µA	0.45	0.75	1.2	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24V, V_{GS} = 0V			1	µA
		V_{DS} = 20V, V_{GS} = 0V, T_J = 125 °C			10	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 5V, V_{GS} = 10V	3.5			A
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 2.2A		43	50	mΩ
		V_{GS} = 2.5V, I_D = 1.8A		60	80	
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 2.5A		5		S
DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 10V, f = 1MHz		362		pF
Output Capacitance	C_{oss}			52		
Reverse Transfer Capacitance	C_{rss}			39		
Total Gate Charge[1,2]	Q_g	V_{DS} = 10V, V_{GS} = 4.5V, I_D = 2.2A		5.2		nC
Gate-Source Charge[1,2]	Q_{gs}			1.5		
Gate-Drain Charge[1,2]	Q_{gd}			1.8		
Turn-On Delay Time[1,2]	$t_{d(on)}$	V_{DS} = 10V, I_D = 1A, V_{GS} = 4.5V, R_{GS} = 6Ω		8		nS
Rise Time[1,2]	t_r			2.5		
Turn-Off Delay Time[1,2]	$t_{d(off)}$			20		
Fall Time[1,2]	t_f			5		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25 °C)						
Continuous Current	I_S				2	A
Pulsed Current[3]	I_{SM}				8	
Forward Voltage[1]	V_{SD}	I_F = I_S, V_{GS} = 0V			1.2	V

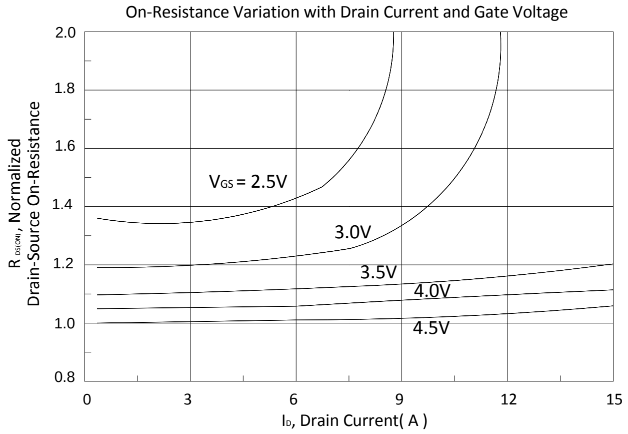
[1] Pulse test : Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2%.

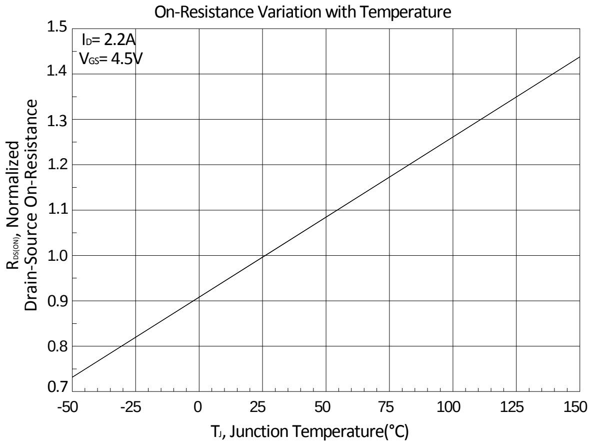
[2] Independent of operating temperature.

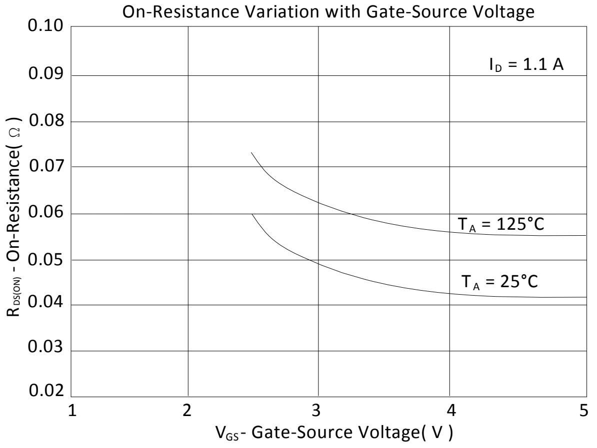
[3] Pulse width limited by maximum junction temperature.

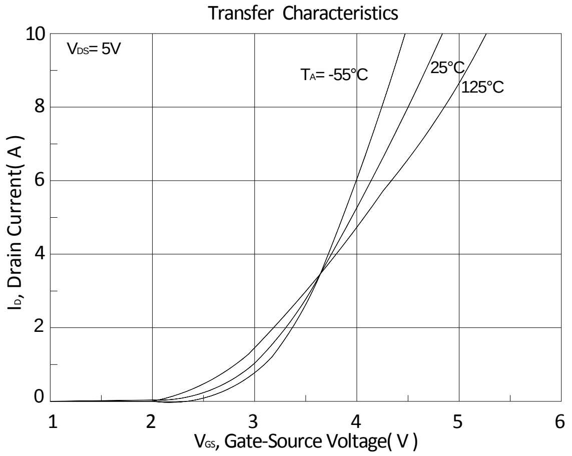
TYPICAL CHARACTERISTICS

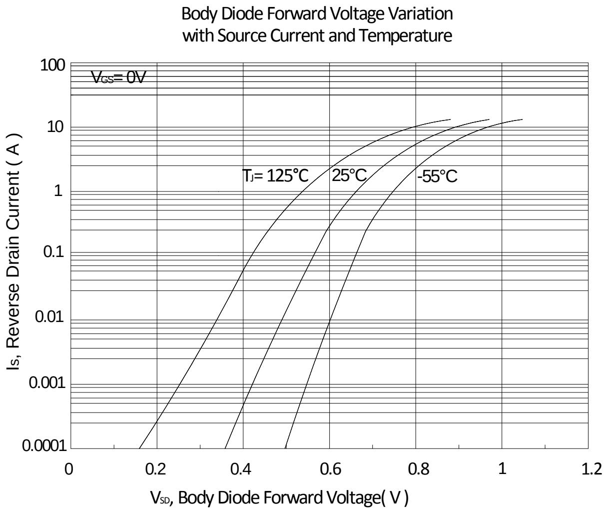


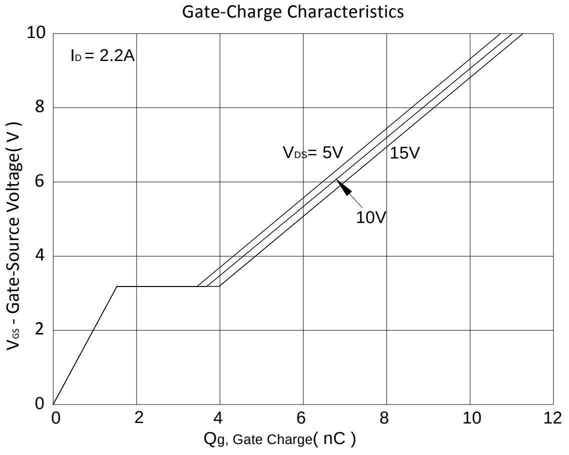


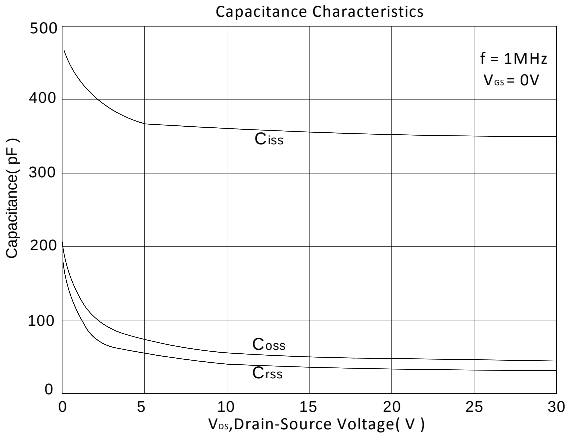


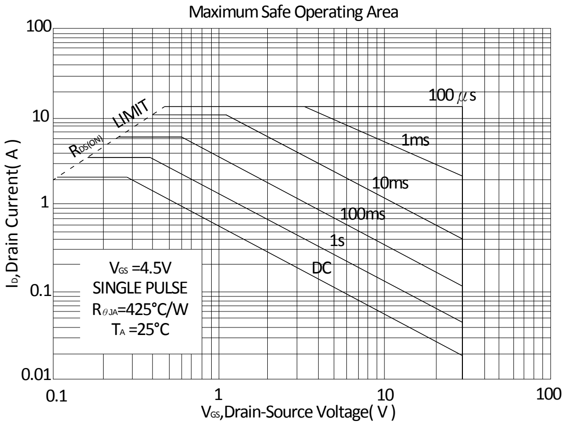


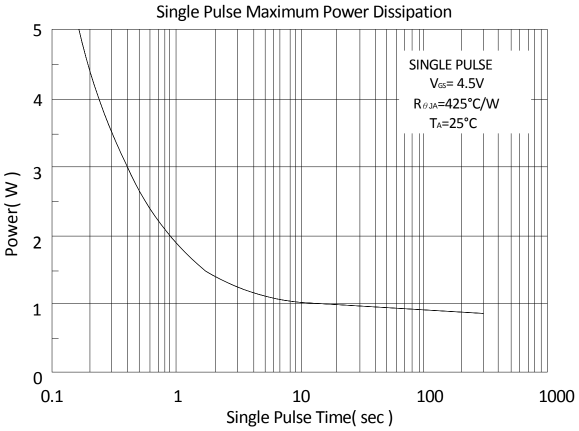


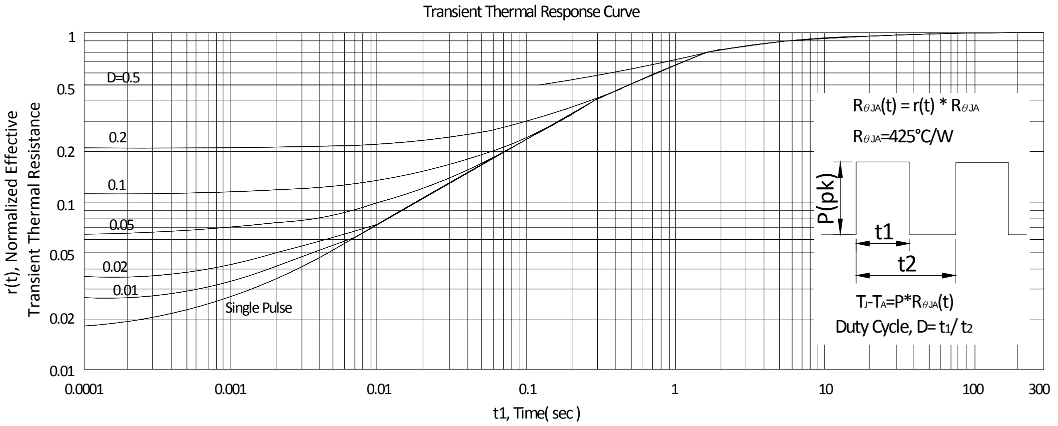



Gate-Charge Characteristics
ID = 2.2A
VDS= 5V
15V
10V
VGS - Gate-Source Voltage(V)
Qg, Gate Charge(nC)
0
2
4
6
8
10
12


Capacitance Characteristics
f = 1MHz
VGS = 0V
Ciss
Coss
Crss
Capacitance(pF)
VDS,Drain-Source Voltage(V)
0
100
200
300
400
500
5
10
15
20
25
30

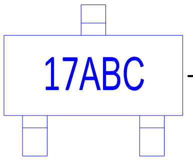

Maximum Safe Operating Area
RDS(ON) LIMIT
100 µs
1ms
10ms
100ms
1s
DC
VGS =4.5V
SINGLE PULSE
RθJA=425°C/W
TA =25°C
ID,Drain Current(A)
VGS,Drain-Source Voltage(V)
0.01
0.1
1
10
100


Single Pulse Maximum Power Dissipation
SINGLE PULSE
VGS= 4.5V
RθJA=425°C/W
TA=25°C
Power(W)
Single Pulse Time(sec)
0
1
2
3
4
5
0.1
1
10
100
1000


Transient Thermal Response Curve
D=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
RθJA(t) = r(t) * RθJA
RθJA=425°C/W
P(pk)
t1
t2
TJ-TA=P*RθJA(t)
Duty Cycle, D= t1/ t2
r(t), Normalized Effective Transient Thermal Resistance
t1, Time(sec)
0.01
0.02
0.05
0.1
0.2
0.5
1
0.0001
0.001
0.01
0.1
1
10
100
300

Ordering & Marking Information:

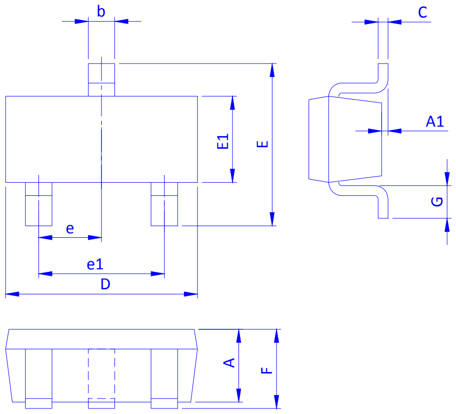
Device Name: EMF50N03M for SC-70



→ 17: Device Code, 17 for EMF50N03

ABC: Date Code

Outline Drawing



Dimension in mm

Dimension	A	A1	b	C	D	E	E1	e	e1	F	G
Min.	0.7	0.0	0.15	0.08						0.90	0.26
Typ.			0.22	0.127	2.1	2.3	1.3	0.65	1.3	0.95	0.4
Max.	1.0	0.1	0.30	0.20						1.10	0.46

Footprint