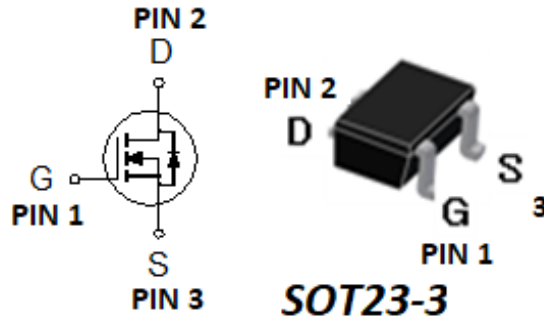


Single N-Channel Logic Level Enhancement Mode Field Effect Transistor

•Product Summary:

	N-CH
BVDSS	20V
$R_{DSON (MAX.)@V_{GS}=4.5V}$	20mΩ
$R_{DSON (MAX.)@V_{GS}=2.5V}$	25mΩ
$R_{DSON (MAX.)@V_{GS}=1.8V}$	35mΩ
$I_D @T_A=25^{\circ}C$	6.0A

• Pin Description:



Single N Channel MOSFET

Rg 100% Tested

RoHS & Halogen Free & TSCA Compliant



• ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^{\circ}C$  Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS	SYMBOL	LIMITS	UNIT
Gate-Source Voltage	$V_{GS}$	±12	V
Continuous Drain Current	$I_D$	$T_A = 25^{\circ}C$	6
		$T_A = 70^{\circ}C$	4
Pulsed Drain Current <sup>1</sup>	$I_{DM}$	24	
Power Dissipation	$P_D$	$T_A = 25^{\circ}C$	1.1
		$T_A = 70^{\circ}C$	0.7
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 <sup>3</sup>	$R_{\theta JA}$		80	°C/W
			Steady-State	

<sup>1</sup>Pulse width limited by maximum junction temperature.

<sup>2</sup>Duty cycle < 1%

<sup>3</sup>The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with  $T_A = 25^{\circ}C$ .

<sup>4</sup>Guarantee by Engineering test

▪ ELECTRICAL CHARACTERISTICS (T<sub>j</sub> = 25 °C, Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS	LIMITS			UNIT
			MIN	TYP	MAX	
<b>STATIC</b>						
Drain-Source Breakdown Voltage <sup>4</sup>	V <sub>(BR)DSS</sub>	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250uA	20			V
Gate Threshold Voltage <sup>4</sup>	V <sub>GS(th)</sub>	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250uA	0.35	0.65	1	
Gate-Body Leakage <sup>4</sup>	I <sub>GSS</sub>	V <sub>DS</sub> = 0V, V <sub>GS</sub> = ±12V			±100	nA
Zero Gate Voltage Drain Current <sup>4</sup>	I <sub>DSS</sub>	V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V			1	uA
		V <sub>DS</sub> = 16V, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125 °C			10	
On-State Drain Current <sup>1</sup>	I <sub>D(ON)</sub>	V <sub>DS</sub> = 5V, V <sub>GS</sub> = 4.5V	6			A
Drain-Source On-State Resistance <sup>1,4</sup>	R <sub>DS(ON)</sub>	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A		17	20	mΩ
		V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 5A		20	25	
		V <sub>GS</sub> = 1.8V, I <sub>D</sub> = 2A		26	35	
Forward Transconductance <sup>1</sup>	g <sub>fs</sub>	V <sub>DS</sub> = 5V, I <sub>D</sub> = 6A		7		S
<b>DYNAMIC</b>						
Input Capacitance <sup>5</sup>	C <sub>iss</sub>	V <sub>GS</sub> = 0V, V <sub>DS</sub> = 10V, f = 1MHz		810		pF
Output Capacitance <sup>5</sup>	C <sub>oss</sub>			128		
Reverse Transfer Capacitance <sup>5</sup>	C <sub>rss</sub>			115		
Gate Resistance <sup>4,5</sup>	R <sub>g</sub>	f = 1MHz		1.4		Ω
Total Gate Charge <sup>1,2,5</sup>	Q <sub>g</sub> (V <sub>GS</sub> =4.5V)	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 6A		12		nC
	Q <sub>g</sub> (V <sub>GS</sub> =2.5V)			7.6		
Gate-Source Charge <sup>1,2,5</sup>	Q <sub>gs</sub>			0.9		
Gate-Drain Charge <sup>1,2,5</sup>	Q <sub>gd</sub>			3.8		
Turn-On Delay Time <sup>1,2,5</sup>	t <sub>d(on)</sub>		V <sub>DS</sub> = 10V, V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 5A, R <sub>g</sub> = 6Ω		8	
Rise Time <sup>1,2,5</sup>	t <sub>r</sub>			90		
Turn-Off Delay Time <sup>1,2,5</sup>	t <sub>d(off)</sub>			30		
Fall Time <sup>1,2,5</sup>	t <sub>f</sub>			110		
<b>SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS</b>						
Continuous Current	I <sub>S</sub>				6	A
Pulsed Current <sup>3</sup>	I <sub>SM</sub>				24	
Forward Voltage <sup>1,4</sup>	V <sub>SD</sub>	I <sub>F</sub> = I <sub>S</sub> , V <sub>GS</sub> = 0V			1.2	V
Reverse Recovery Time <sup>5</sup>	t <sub>rr</sub>	I <sub>F</sub> = I <sub>S</sub> , dI <sub>F</sub> /dt = 100A / uS		13.1		nS
Reverse Recovery Charge <sup>5</sup>	Q <sub>rr</sub>			3.3		nC

<sup>1</sup>Pulse test : Pulse Width ≤ 300 usec, Duty Cycle ≤ 2%.

<sup>2</sup>Independent of operating temperature.

<sup>3</sup>Pulse width limited by maximum junction temperature.

<sup>4</sup>Guarantee by FT test Item

<sup>5</sup>Guarantee by Engineering test

EMC will review datasheet by quarter, and update new version.



▪TYPICAL CHARACTERISTICS

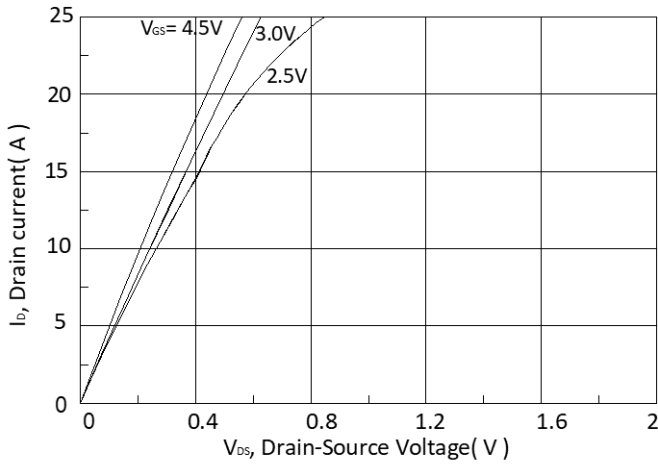


Fig.1 Typical Output Characteristics

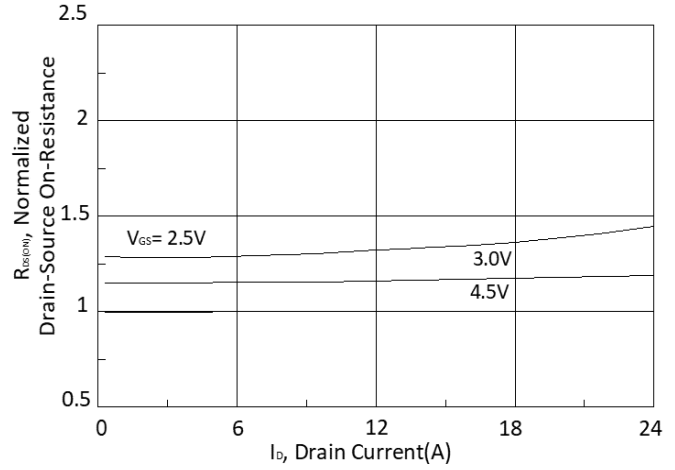


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

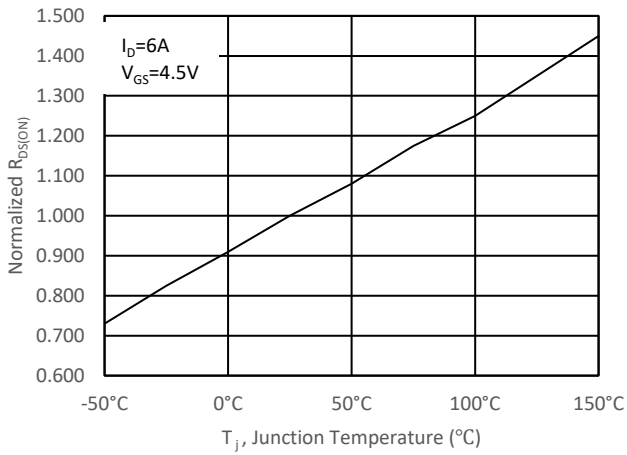


Fig.3 Normalized On-Resistance v.s. Junction Temperature

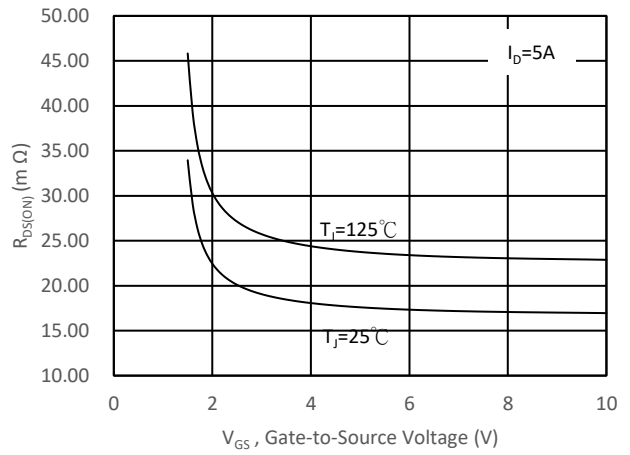


Fig.4 On-Resistance v.s. Gate Voltage

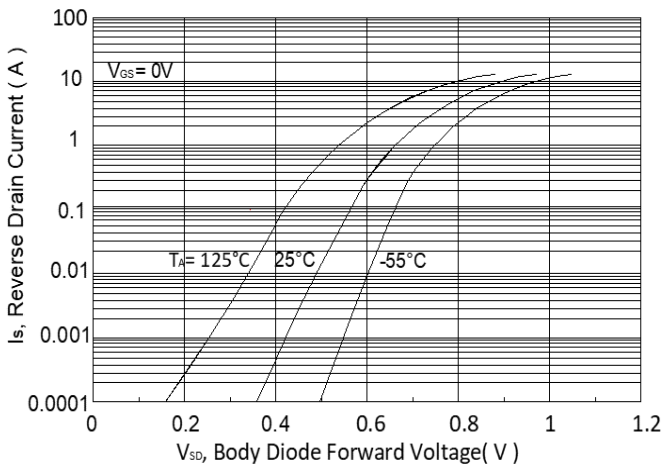


Fig.5 Forward Characteristic of Reverse Diode

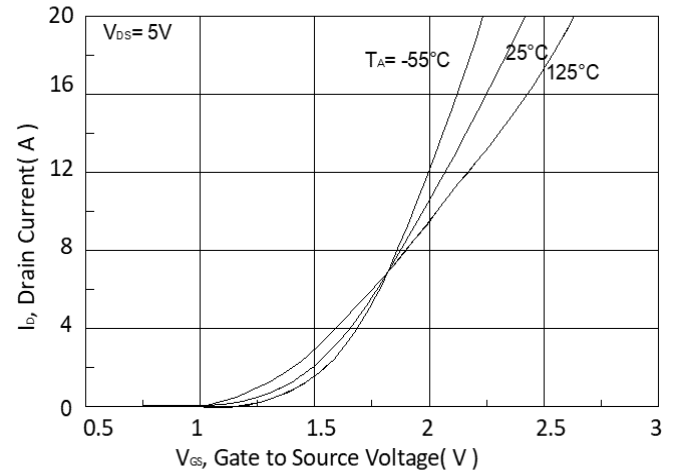
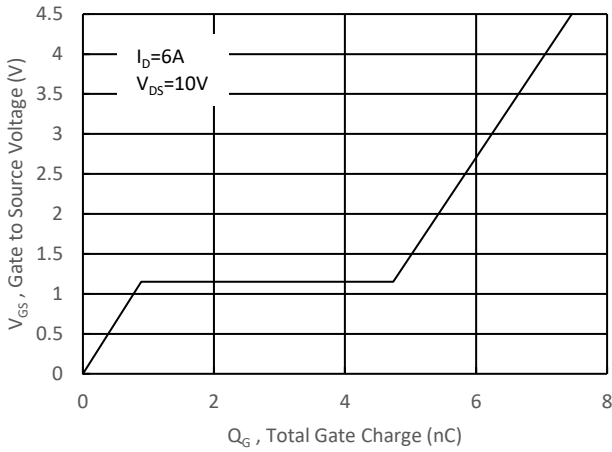
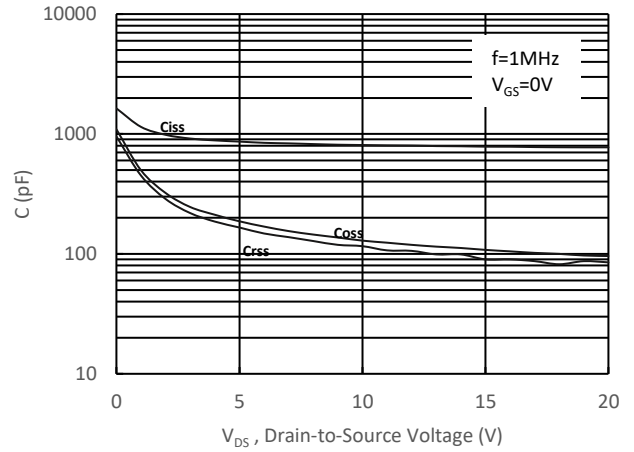


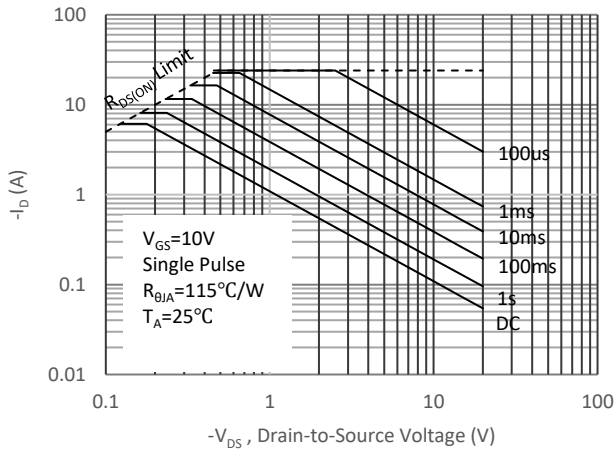
Fig.6 Transfer Characteristics



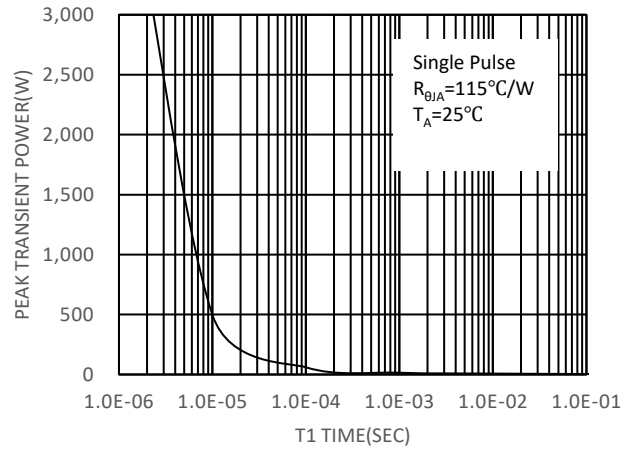
**Fig.7 Gate Charge Characteristics**



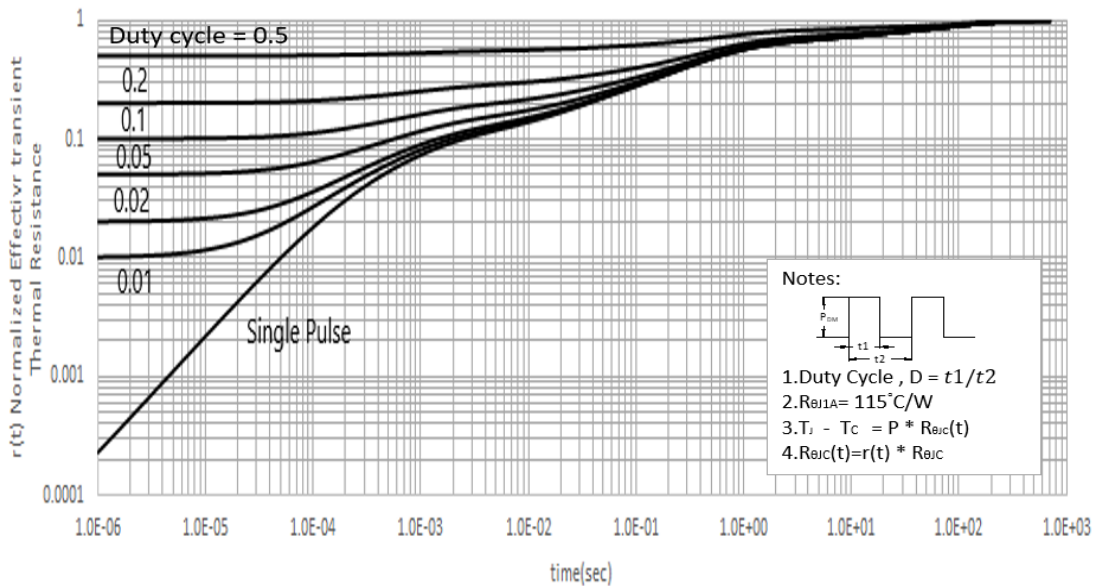
**Fig.8 Typical Capacitance Characteristics**



**Fig 9. Maximum Safe Operating Area**



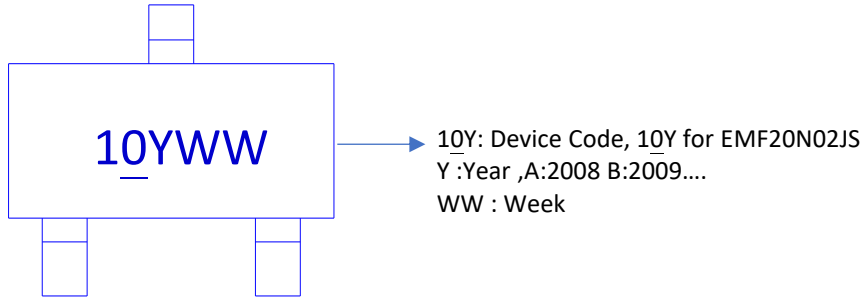
**Fig 10. Single Pulse Maximum Power Dissipation**



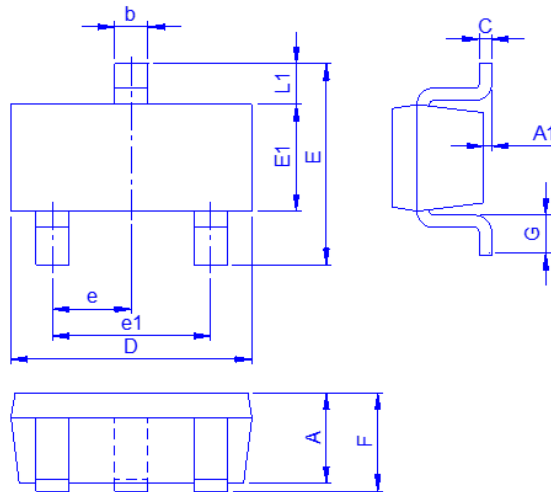
**Fig 11. Effective Transient Thermal Impedance**

**Ordering & Marking Information:**

Device Name: EMF20N02JS for SOT23-3

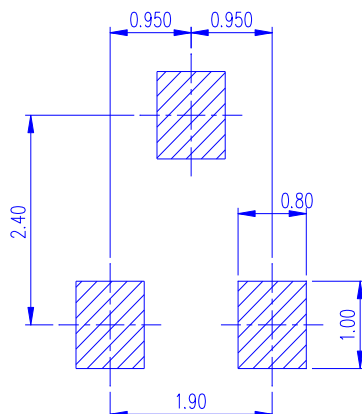


**Outline Drawing**



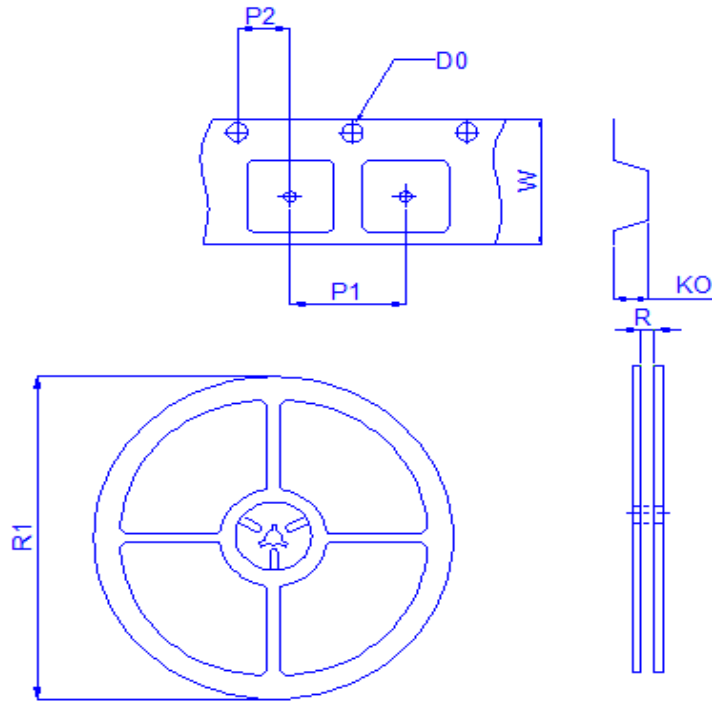
Dimension	A	A1	b	C	D	E	E1	e	e1	F	G	L1
Min.	0.88	-	0.30	0.08	2.80	2.10	1.20	0.90	1.80	0.89	0.30	-
Typ.	0.95	-	-	-	2.90	2.50	1.30	0.95	1.90	-	-	0.54
Max.	1.10	0.10	0.50	0.202	3.04	2.64	1.40	1.00	2.00	1.20	0.60	-

**Footprint**





◆ Tape&Reel Information:3000pcs/Reel



Package	SOT23-3
Reel	7"
Device orientation	<p>FEED DIRECTION</p>

Dimension in mm

Dimension	Carrier tape					Reel	
	D0	K0	P1	P2	W	R	R1
Typ.	1.53	1.45	4	2	8	8.5	178
±	0.2	0.5	0.2	0.2	0.5	REF	REF