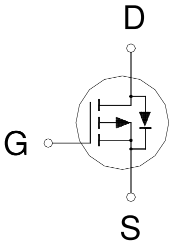
P-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

BV_{DSS}	-20V
$R_{DSON\ (MAX.)}$	9.5mΩ
I_D	-24A



P Channel MOSFET

UIS, Rg 100% Tested

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}	±8	V
Continuous Drain Current	T_C = 25 °C	I_D	-24	A
	T_A= 25 °C(t≦10s)		-13	
	T_A= 25 °C(Steady-State)		-10	
	T_C = 100 °C		-17	
Pulsed Drain Current[1]		I_{DM}	-96	
Avalanche Current		I_{AS}	-15	
Avalanche Energy	L = 0.1mH, I_{AS}=-15A, R_G=25Ω	E_{AS}	11.25	mJ
Repetitive Avalanche Energy[2]	L = 0.05mH	E_{AR}	5.6	
Power Dissipation	T_C = 25 °C	P_D	21	W
	T_C = 100 °C		8.3	
Power Dissipation	T_A = 25 °C	P_D	2.5	W
	T_A = 70 °C		1.6	
Operating Junction & Storage Temperature Range		T_j, T_{stg}	-55 to 150	°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE		SYMBOL	TYPICAL	MAXIMUM	UNIT
Junction-to-Case		$R_{\theta JC}$		6	°C / W
Junction-to-Ambient[3]	t ≦ 10s	$R_{\theta JA}$		50	
Junction-to-Ambient[3]	Steady-State	$R_{\theta JA}$		75	

[1] Pulse width limited by maximum junction temperature.

[2] Duty cycle ≤ 1%

[3] 75°C / W when mounted on a 1 in^2 pad of 2 oz copper.

ELECTRICAL CHARACTERISTICS (T_J = 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	-20			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -250μA	-0.4	-0.75	-1.2	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±8V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = -16V, V_{GS} = 0V			-1	μA
		V_{DS} = -12V, V_{GS} = 0V, T_J = 125 °C			-10	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = -5V, V_{GS} = -4.5V	-24			A
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = -4.5V, I_D = -15A		7.8	9.5	mΩ
		V_{GS} = -2.5V, I_D = -8A		10.3	12.5	
		V_{GS} = -1.8V, I_D = -5A		14.5	18	
Forward Transconductance[1]	g_{fs}	V_{DS} = -5V, I_D = -15A		32		S
DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = -10V, f = 1MHz		4655		pF
Output Capacitance	C_{oss}			503		
Reverse Transfer Capacitance	C_{rss}			470		
Gate Resistance	R_g	V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz		3.0		Ω
Total Gate Charge[1,2]	Q_g(V_{GS}=-4.5V)	V_{DS} = -10V, V_{GS} = -4.5V, I_D = -15A		45		nC
	Q_g(V_{GS}=-2.5V)			26		
Gate-Source Charge[1,2]	Q_{gs}			5.5		
Gate-Drain Charge[1,2]	Q_{gd}			10.5		
Turn-On Delay Time[1,2]	$t_{d(on)}$	V_{DS} = -10V, I_D = -1A, V_{GS} = -4.5V, R_{GS} = 6Ω		25		nS
Rise Time[1,2]	t_r			55		
Turn-Off Delay Time[1,2]	$t_{d(off)}$			150		
Fall Time[1,2]	t_f			65		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25 °C)						
Continuous Current	I_S				-24	A
Pulsed Current[3]	I_{SM}				-96	
Forward Voltage[1]	V_{SD}	I_F = -15A, V_{GS} = 0V			-1.2	V

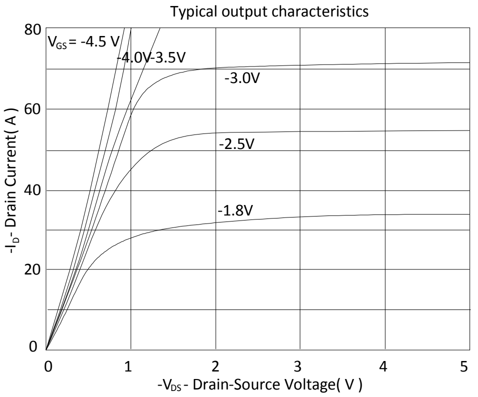
[1] Pulse test : Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2％.

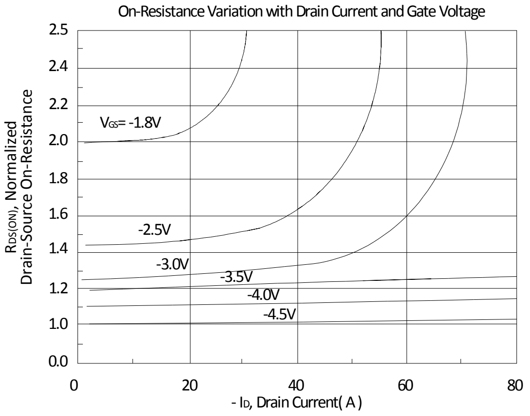
[2] Independent of operating temperature.

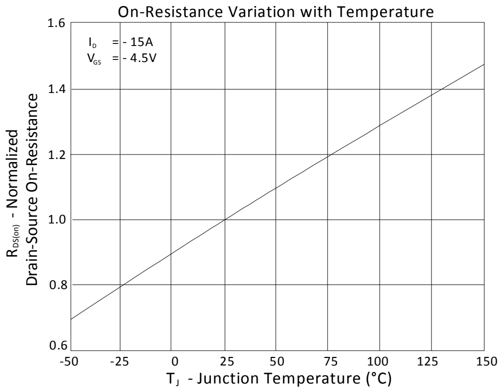
[3] Pulse width limited by maximum junction temperature.

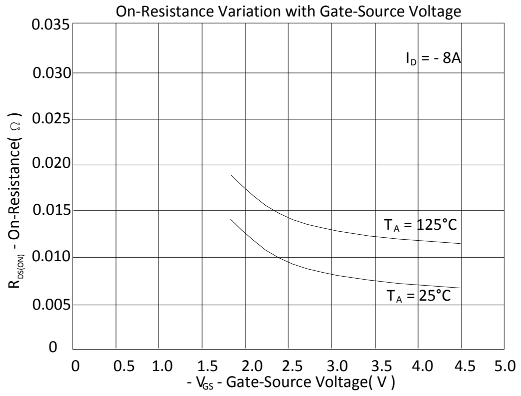
EMC will review datasheet by quarter, and update new version.

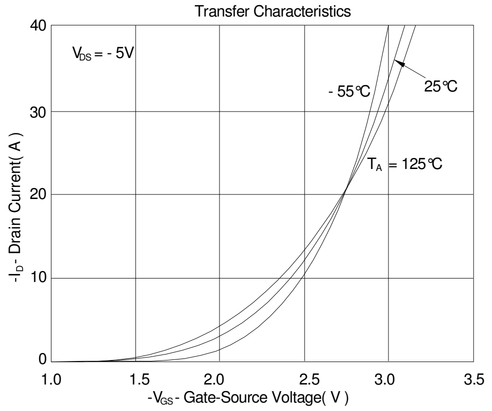
TYPICAL CHARACTERISTICS

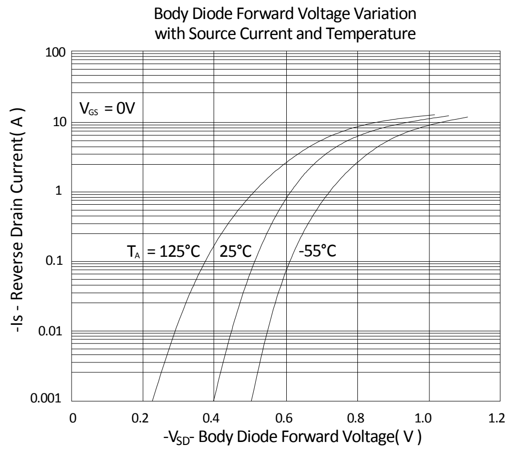

Typical output characteristics

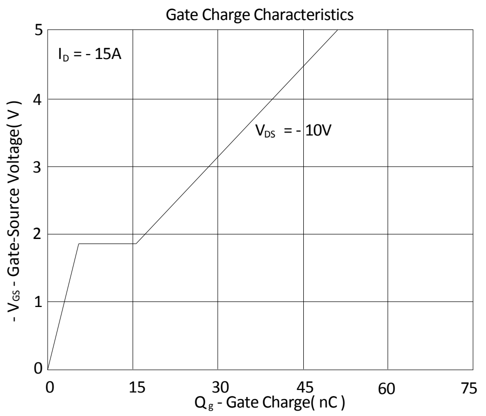

On-Resistance Variation with Drain Current and Gate Voltage

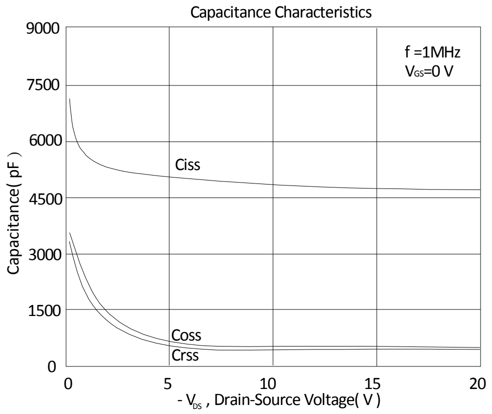

On-Resistance Variation with Temperature

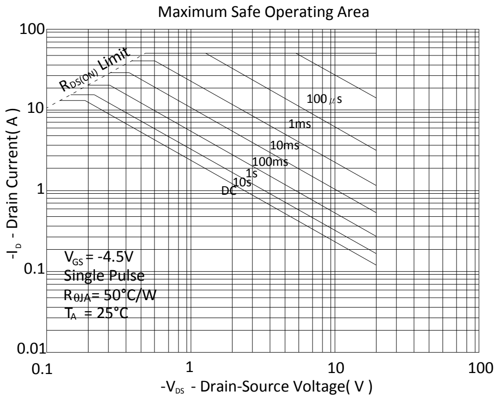

On-Resistance Variation with Gate-Source Voltage

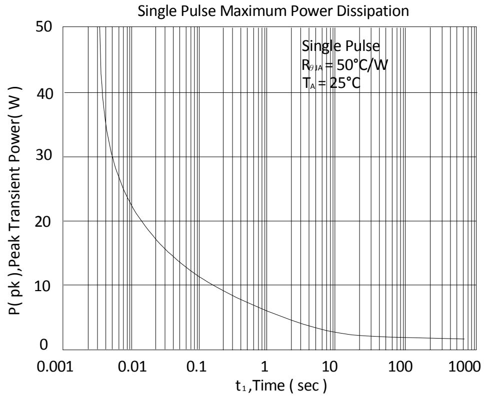

Transfer Characteristics

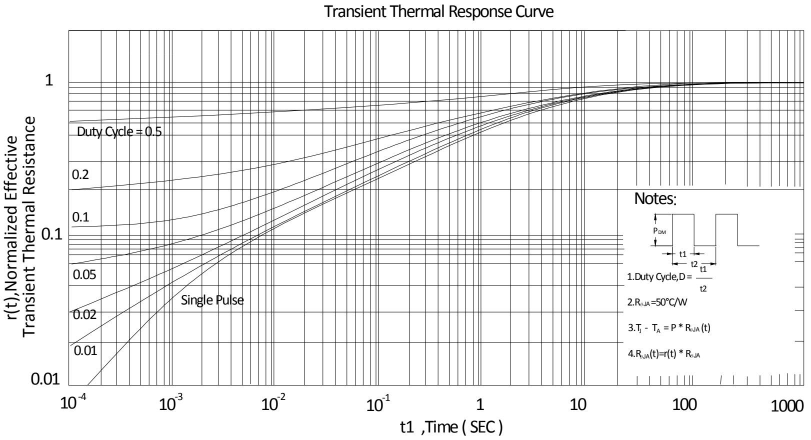

Body Diode Forward Voltage Variation
with Source Current and Temperature


Gate Charge Characteristics
I_D = - 15A
V_{DS} = - 10V
- V_{GS} - Gate-Source Voltage(V)
0
1
2
3
4
5
0
15
30
45
60
75
Q_g - Gate-Charge(nC)


Capacitance Characteristics
f =1MHz
V_{GS}=0 V
Ciss
Coss
Crss
Capacitance(pF)
0
1500
3000
4500
6000
7500
9000
0
5
10
15
20
- V_{DS} , Drain-Source Voltage(V)

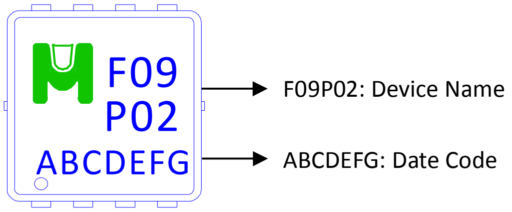

Maximum Safe Operating Area
$R_{DS(ON)}$ Limit
100 μs
1ms
10ms
100ms
1s
10s
DC
V_{GS} = -4.5V
Single Pulse
RθJA= 50°C/W
T_A = 25°C
-I_D - Drain Current(A)
0.01
0.1
1
10
100
0.1
1
10
100
-V_{DS} - Drain-Source Voltage(V)


Single Pulse Maximum Power Dissipation
Single Pulse
$R_{\theta JA}$ = 50°C/W
T_A = 25°C
P(pk),Peak Transient Power(W)
0
10
20
30
40
50
0.001
0.01
0.1
1
10
100
1000
t_1 ,Time (sec)


Transient Thermal Response Curve
r(t),Normalized Effective Transient Thermal Resistance
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
0.01
0.1
1
10^{-4}
10^{-3}
10^{-2}
10^{-1}
1
10
100
1000
t1 ,Time (SEC)
Notes:
P_{DM}
t1
t2
1.Duty Cycle,D = $\frac{t1}{t2}$
2.$R_{\theta JA}$=50°C/W
3.T_J - T_A = P * $R_{\theta JA}$ (t)
4.$R_{\theta JA}$(t)=r(t) * $R_{\theta JA}$

Ordering & Marking Information:

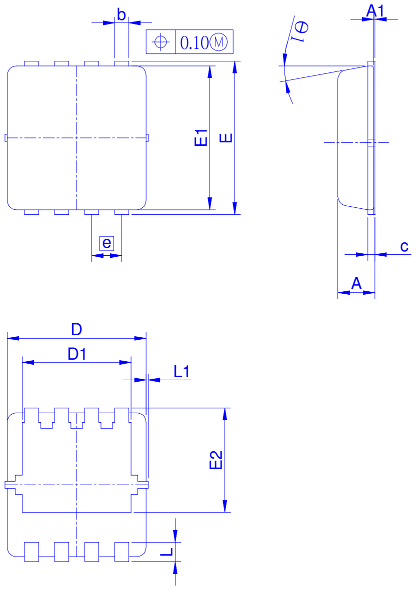
Device Name: EMF09P02V for EDFN3X3



F09P02: Device Name

ABCDEFG: Date Code

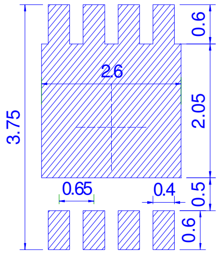
Outline Drawing



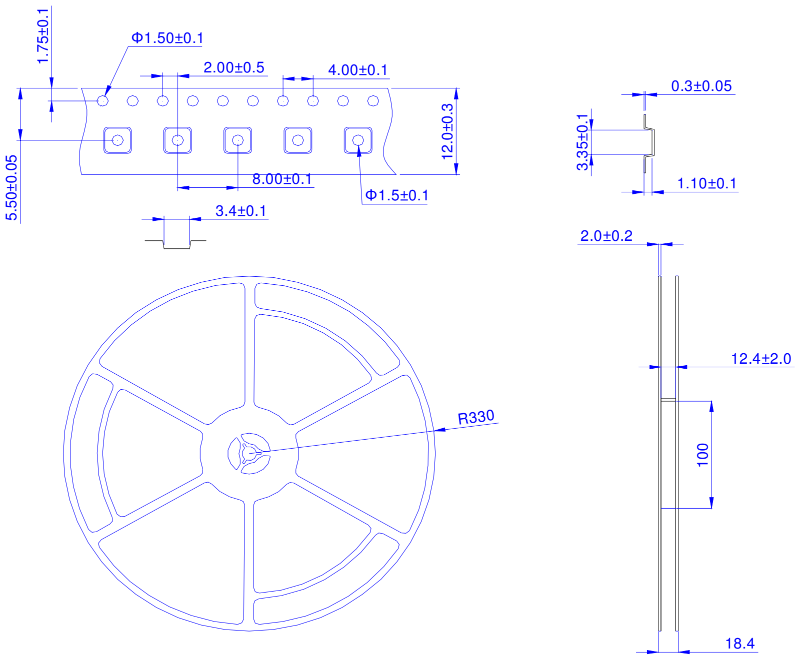
Dimension in mm

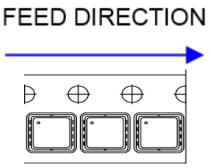
Dimension	A	A1	b	c	D	D1	E	E1	E2	e	L	L1	Θ1
Min.	0.65	0	0.20	0.10	2.90	2.15	3.10	2.90	1.53	0.55	0.25	-	0°
Typ.	0.75	-	0.30	0.15	3.00	2.45	3.20	3.00	1.97	0.65	0.40	0.075	10°
Max.	0.90	0.05	0.40	0.25	3.30	2.74	3.50	3.30	2.59	0.75	0.60	0.150	14°

Recommended minimum pads



- Tape&Reel Information: 5000pcs/Reel



產品別	EDFN3X3
Reel 尺寸	13”
編帶方式	 FEED DIRECTION
前空格	50
後空格	50
裝箱數	
滿捲數量	5K
捲/內盒比	1 : 1
內盒滿箱數	5K
內/外箱比	10 : 1
外箱滿箱數	50K