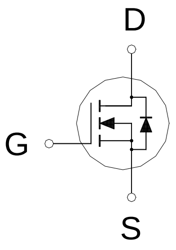
N-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

BV_{DSS}	30V
R_{DSON} (MAX.)	1.7mΩ
I_D	100A



UIS, Rg 100% Tested

Pb-Free Lead Plating & Halogen Free

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

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNIT
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current[1]	T_C = 25 °C	I_D	100	A
	T_C = 100 °C		100	
Pulsed Drain Current[2]		I_{DM}	400	
Avalanche Current		I_{AS}	80	
Avalanche Energy	L = 0.1mH, I_D=80A, R_G=25Ω	E_{AS}	320	mJ
Repetitive Avalanche Energy[3]	L = 0.05mH	E_{AR}	160	
Power Dissipation	T_C = 25 °C	P_D	83	W
	T_C = 100 °C		33	
Operating Junction & Storage Temperature Range		T_j, T_{stg}	-55 to 150	°C

100% UIS testing in condition of V_D=15V, L=0.1mH, V_G=10V, I_L=40A, Rated V_{DS}=30V N-CH

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNIT
Junction-to-Case	$R_{\theta JC}$		1.5	°C / W
Junction-to-Ambient[4]	$R_{\theta JA}$		50	

[1] Package Limited.

[2] Pulse width limited by maximum junction temperature.

[3] Duty cycle ≤ 1%

[4] 50°C / W when mounted on a 1 in^2 pad of 2 oz copper.

ELECTRICAL CHARACTERISTICS (T_C = 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	1	2	3	
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			25	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 10V, V_{GS} = 10V	100			A
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 30A		1.4	1.7	mΩ
		V_{GS} = 4.5V, I_D = 30A		1.9	2.6	
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 30A		50		S
DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 15V, f = 1MHz		6140		pF
Output Capacitance	C_{oss}			933		
Reverse Transfer Capacitance	C_{rss}			371		
Gate Resistance	R_g	V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz		2.0		Ω
Total Gate Charge[1,2]	$Q_g(V_{GS}=10V)$	V_{DS} = 15V, V_{GS} = 10V, I_D = 30A		67		nC
	$Q_g(V_{GS}=4.5V)$			32		
Gate-Source Charge[1,2]	Q_{gs}			15		
Gate-Drain Charge[1,2]	Q_{gd}			14		
Turn-On Delay Time[1,2]	$t_{d(on)}$	V_{DS} = 15V, I_D = 1A, V_{GS} = 10V, R_{GS} = 2.7Ω		20		nS
Rise Time[1,2]	t_r			15		
Turn-Off Delay Time[1,2]	$t_{d(off)}$			60		
Fall Time[1,2]	t_f			30		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25 °C)						
Continuous Current[4]	I_S				100	A
Pulsed Current[3]	I_{SM}				400	
Forward Voltage[1]	V_{SD}	I_F = 30A, V_{GS} = 0V			1.2	V
Reverse Recovery Time	t_{rr}	I_F = I_S, dI_F/dt = 100A / μS		36		nS
Peak Reverse Recovery Current	$I_{RM(REC)}$			200		A
Reverse Recovery Charge	Q_{rr}			30		nC

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

[2] Independent of operating temperature.

[3] Pulse width limited by maximum junction temperature.

[4] Package Limited.

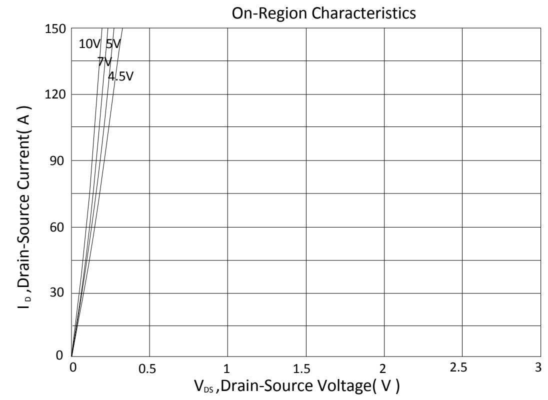
Ordering & Marking Information:

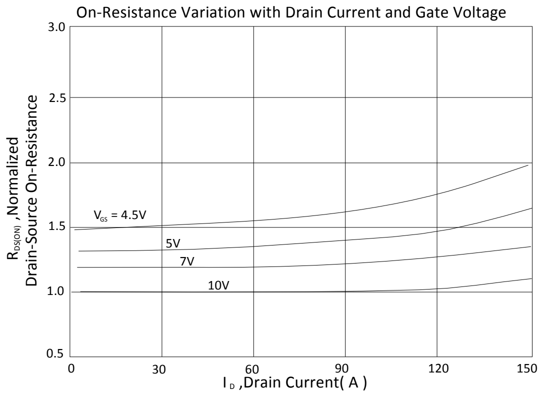
Device Name: EMB02N03HR for EDFN 5 x 6

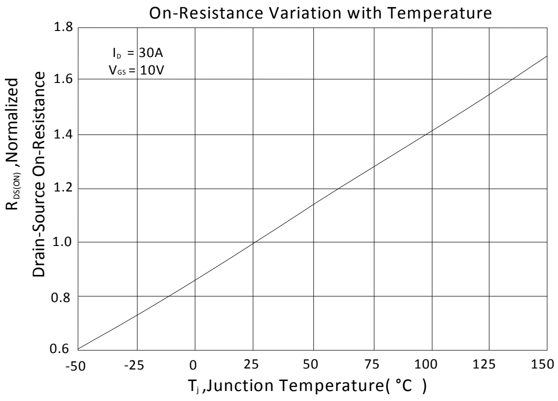
B02N03R: Device Name

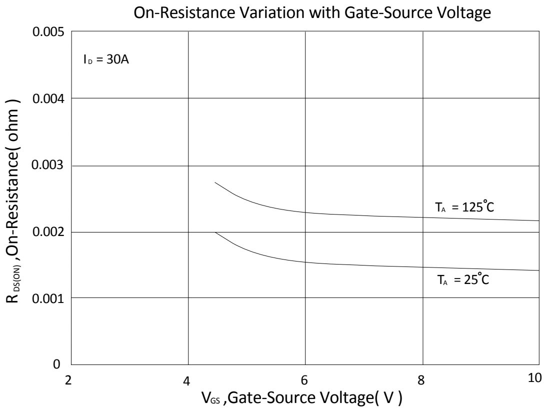
ABCDEFG: Date Code

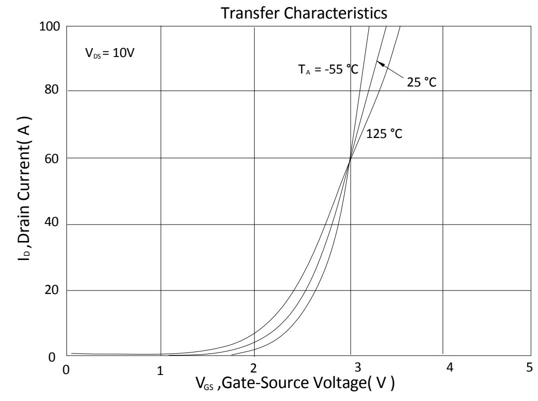
TYPICAL CHARACTERISTICS

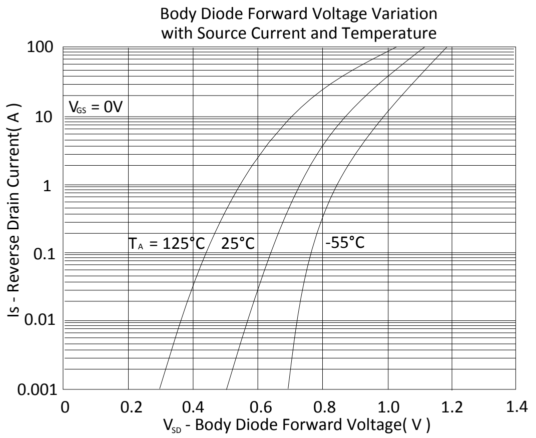

On-Region Characteristics

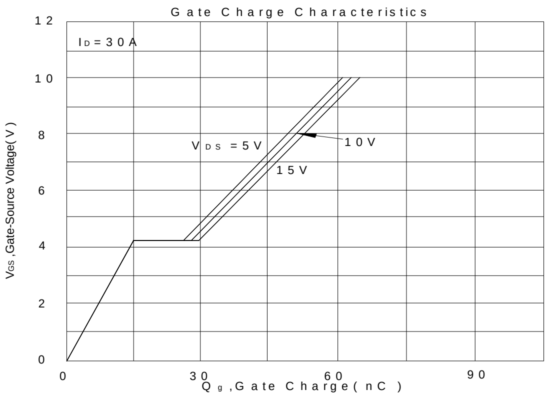

On-Resistance Variation with Drain Current and Gate Voltage

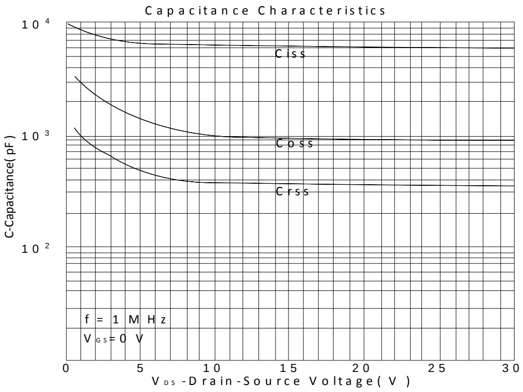

On-Resistance Variation with Temperature

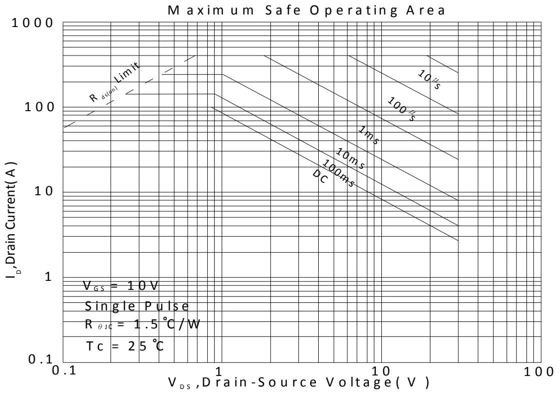

On-Resistance Variation with Gate-Source Voltage

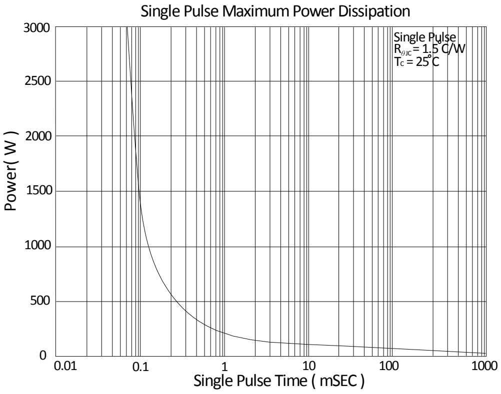

Transfer Characteristics

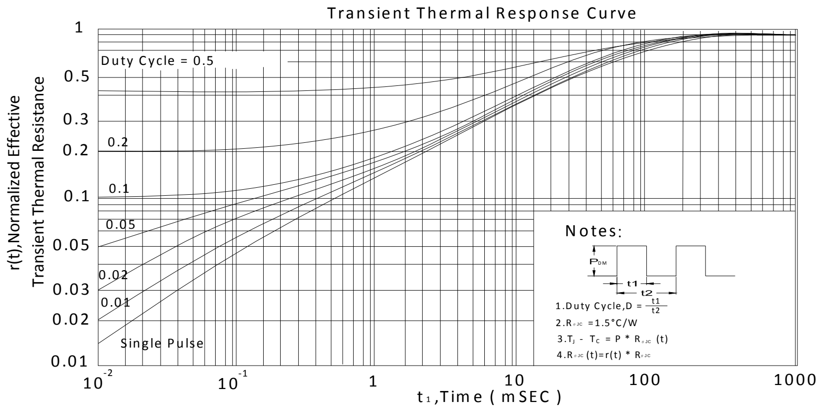

Body Diode Forward Voltage Variation
with Source Current and Temperature


Gate Charge Characteristics
ID = 30A
VDS = 5V
10V
15V
VGS,Gate-Source Voltage(V)
0
2
4
6
8
10
12
0
30
60
90
Qg,Gate Charge(nC)

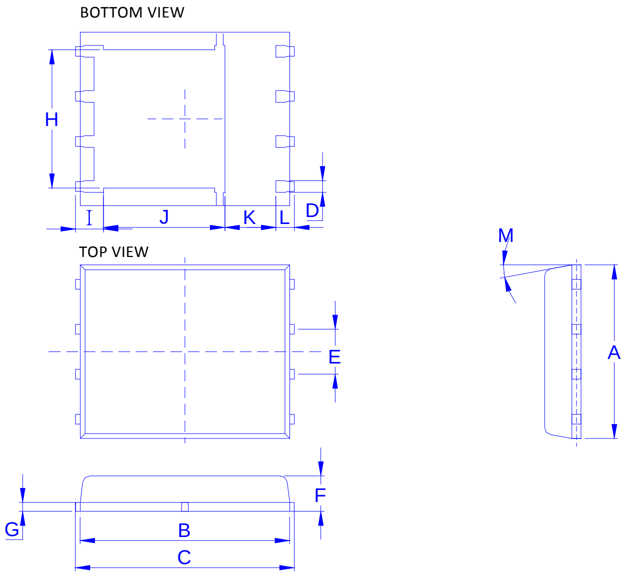

Capacitance Characteristics
Ciss
Coss
Crss
f = 1 MHz
VGS = 0 V
C-Capacitance(pF)
10²
10³
10⁴
0
5
10
15
20
25
30
VDS-Drain-Source Voltage(V)


Maximum Safe Operating Area
RDS(on) Limit
10μs
100μs
1ms
10ms
100ms
DC
VGS = 10V
Single Pulse
RθJC = 1.5°C/W
Tc = 25°C
ID,Drain Current(A)
0.1
1
10
100
1000
0.1
1
10
100
VDS,Drain-Source Voltage(V)


Single Pulse Maximum Power Dissipation
Single Pulse
RθJC = 1.5°C/W
Tc = 25°C
Power(W)
0
500
1000
1500
2000
2500
3000
0.01
0.1
1
10
100
1000
Single Pulse Time (mSEC)


Transient Thermal Response Curve
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
r(t),Normalized Effective Transient Thermal Resistance
0.01
0.02
0.03
0.05
0.1
0.2
0.3
0.5
1
10⁻²
10⁻¹
1
10
100
1000
t1,Time (mSEC)
Notes:
PDM
t1
t2
1.Duty Cycle,D = t1/t2
2.RθJC = 1.5°C/W
3.TJ - TC = P * RθJC (t)
4.RθJC (t)=r(t) * RθJC

Outline Drawing



Dimension in mm

Dimension	A	B	C	D	E	F	G	H	I	J	K	L	M
Min.	4.80	5.50	5.90	0.3		0.85	0.15	3.67	0.41	3.00	0.94	0.45	0°
Typ.					1.27								
Max.	5.30	5.90	6.15	0.51		1.20	0.30	4.54	0.85	3.92	1.7	0.71	12°

Recommended minimum pads