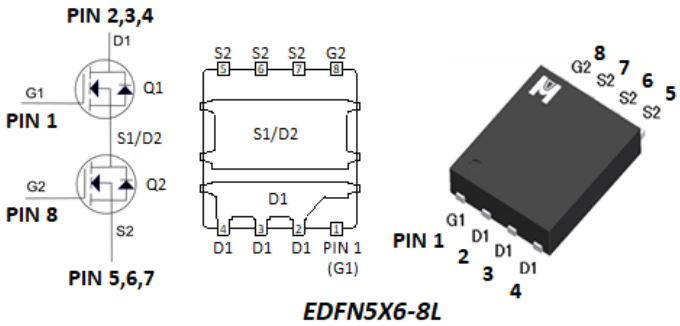
杰力科技股份有限公司
Excelliance MOS Corporation

EMB09K03HP

Dual N-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

	N-CH-Q1	N-CH-Q2
BV_{DSS}	30V	30V
$R_{DSON\ (MAX.)}$	15mΩ	9.5mΩ
I_D	12A	15A



EDFN5X6-8L

Dual N Channel MOSFET

UIS, Rg 100% Tested

RoHS & Halogen Free & TSCA Compliant

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

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS		UNIT
			Q1	Q2	
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current	T_C = 25 °C	I_D	12	15	A
	T_C = 100 °C		9.6	12	
Pulsed Drain Current[1]		I_{DM}	48	60	
Avalanche Current		I_{AS}	12	15	
Avalanche Energy	L = 0.1mH, R_G=25Ω	E_{AS}	7.2	11.25	mJ
Repetitive Avalanche Energy[2]	L = 0.05mH	E_{AR}	3.6	5.625	
Power Dissipation	T_C = 25 °C	P_D	48	69	W
	T_C = 100 °C		19	27	
Operating Junction & Storage Temperature Range		T_j, T_{stg}	-55 to 150		°C

100% UIS testing in condition of VD=25V, L=0.1mH, VG=10V, IL=7A, Rated VDS=30V N-CH

100% UIS testing in condition of VD=25V, L=0.1mH, VG=10V, IL=9A, Rated VDS=30V N-CH

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL		TYPICAL	MAXIMUM		UNIT
Junction-to-Case	$R_{\theta JC}$	Steady State		2.6	1.8	°C / W
Junction-to-Ambient	$R_{\theta JA}$	Steady State		62	60	
	$R_{\theta JA}$	t ≦ 10 s		27	25	

[1]Pulse width limited by maximum junction temperature.

[2]Duty cycle < 1%

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

[4]Guarantee by Engineering test

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	Q1	30			V
			Q2	30			
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	Q1	1	1.5	3	
			Q2	1	1.5	3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	Q1			±100	nA
			Q2			±100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 24V, V_{GS} = 0V	Q1			1	μA
			Q2			1	
		V_{DS} = 20V, V_{GS} = 0V, T_J = 125 °C	Q1			25	
			Q2			25	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 10V, V_{GS} = 10V	Q1	12			A
			Q2	15			
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 8A	Q1		12.5	15	mΩ
		V_{GS} = 10V, I_D = 10A	Q2		8.2	9.5	
		V_{GS} = 4.5V, I_D = 5A	Q1		18.9	26	
		V_{GS} = 4.5V, I_D = 6A	Q2		11	15	
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 8A	Q1		15		S
		V_{DS} = 5V, I_D = 10A	Q2		18		
DYNAMIC							
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 15V, f = 1MHz	Q1		597		pF
			Q2		828		
Output Capacitance	C_{oss}		Q1		111		
			Q2		196		
Reverse Transfer Capacitance	C_{rss}		Q1		96		
			Q2		174		
Gate Resistance	R_g	V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz	Q1		2.0		Ω
			Q2		1.7		
Total Gate Charge[1,2]	Q_g(V_{GS}=10V)	V_{DD} = 15V, V_{GS} = 10V, I_D = 10A	Q1		14		nC
			Q2		17.6		
	Q_g(V_{GS}=4.5V)		Q1		8		
			Q2		12.5		

Gate-Source Charge[1,2]	Q_{gs}	V_{DD} = 15V, V_{GS} = 10V, I_D = 10A	Q1		1.8		
			Q2		2.8		
Gate-Drain Charge[1,2]	Q_{gd}		Q1		4.7		
			Q2		7.4		
Turn-On Delay Time[1,2]	$t_{d(on)}$	V_{DD} = 15V, I_D = 5A, V_{GS} = 10V, R_G = 3Ω	Q1		6		nS
			Q2		8		
Rise Time[1,2]	t_r		Q1		8		
			Q2		18		
Turn-Off Delay Time[1,2]	$t_{d(off)}$		Q1		18		
			Q2		20		
Fall Time[1,2]	t_f		Q1		10		
			Q2		12		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25 °C)							
Continuous Current	I_S		Q1			12	A
			Q2			15	
Pulsed Current[3]	I_{SM}		Q1			48	
			Q2			60	
Forward Voltage[1]	V_{SD}	I_F = 8A, V_{GS} = 0V	Q1			1.3	V
		I_F = 10A, V_{GS} = 0V	Q2			1.3	
Reverse Recovery Time	t_{rr}	Q1 I_F = 8A, dI_F/dt = 100A / μS	Q1		18		nS
			Q2		22		
Reverse Recovery Charge	Q_{rr}	Q2 I_F = 10A, dI_F/dt = 100A / μS	Q1		5		nC
			Q2		6		

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

[2]Independent of operating temperature.

[3]Pulse width limited by maximum junction temperature.

Ordering & Marking Information:

Device Name: EMB09K03HP for Asymmetric Dual EDFN 5 x 6

B09K03: Device Name

ABCDEFG: Date Code

A: Assembly House

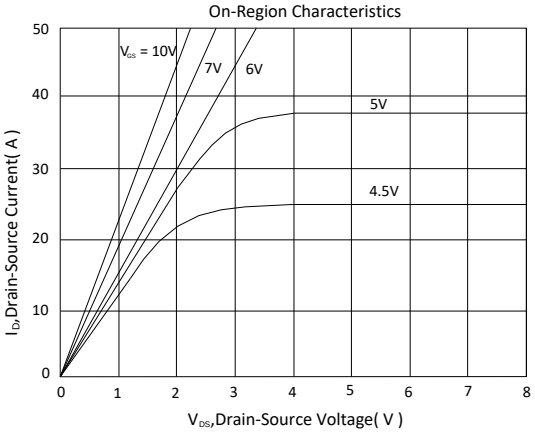
B: Year(A:2008 B:2009 C:2010….)

C: Month(A:01 B:02 C:03 D:04 E:05 F:06 G:07 H:08 I:09 J:10 K:11 L:12)

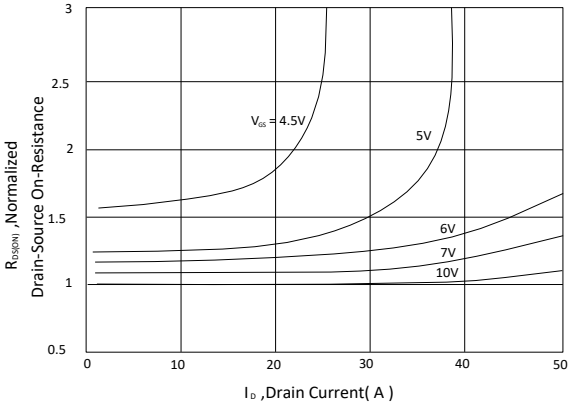
DEFG: Serial No.

Q1 TYPICAL CHARACTERISTICS

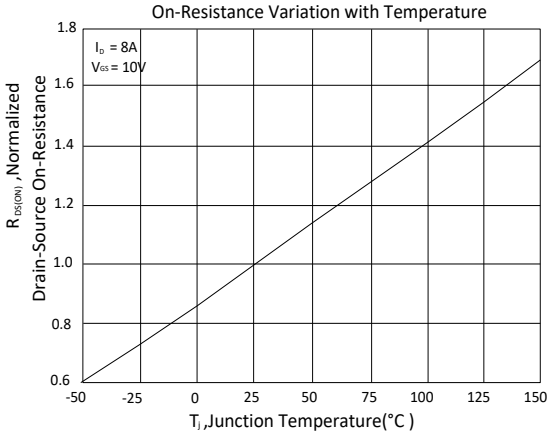
On-Region Characteristics



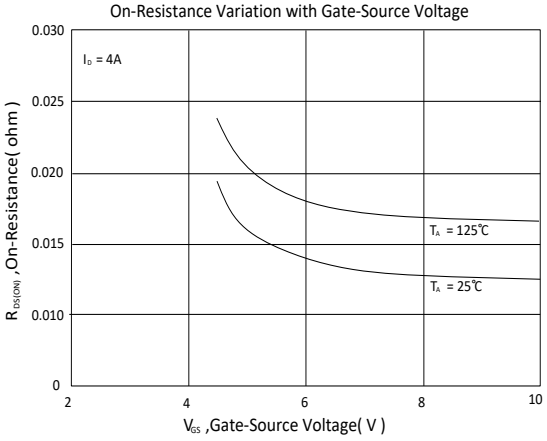
On-Resistance Variation with Drain Current and Gate Voltage



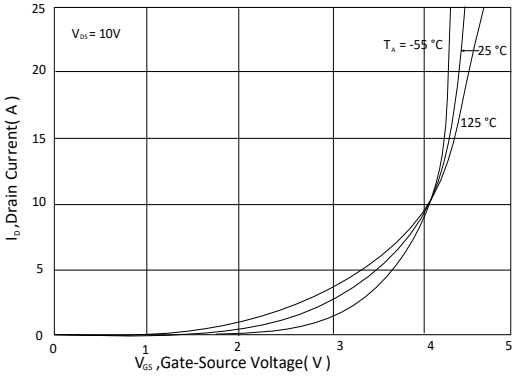
On-Resistance Variation with Temperature



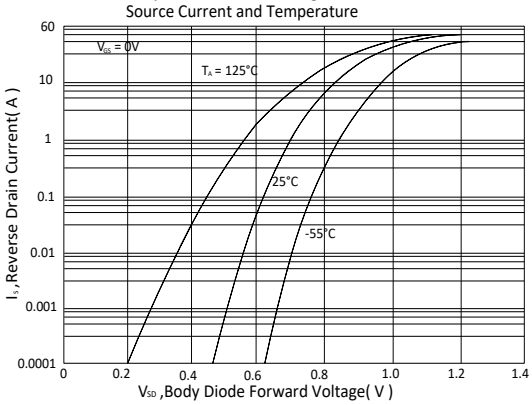
On-Resistance Variation with Gate-Source Voltage

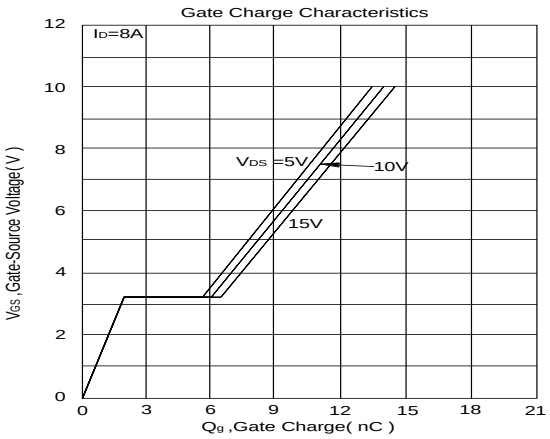


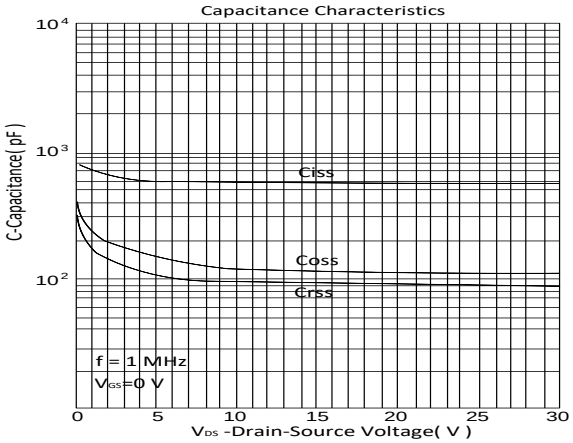
Transfer Characteristics

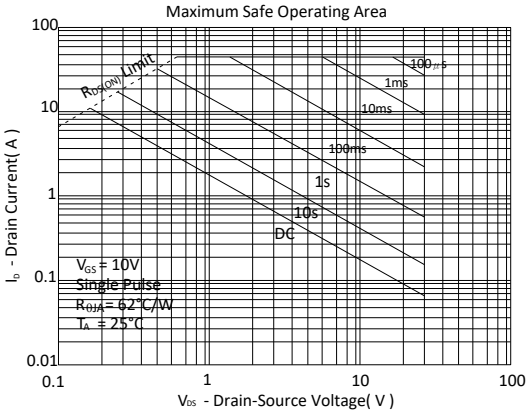


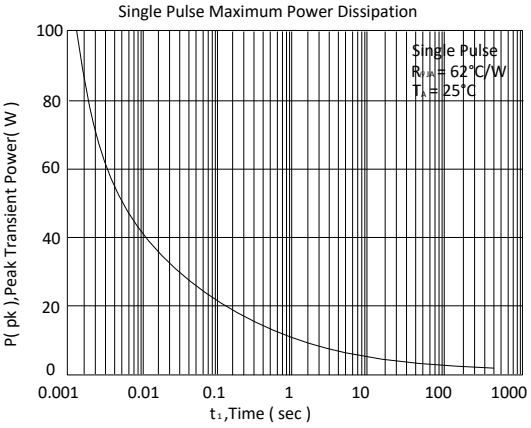
Body Diode Forward Voltage Variation with Source Current and Temperature

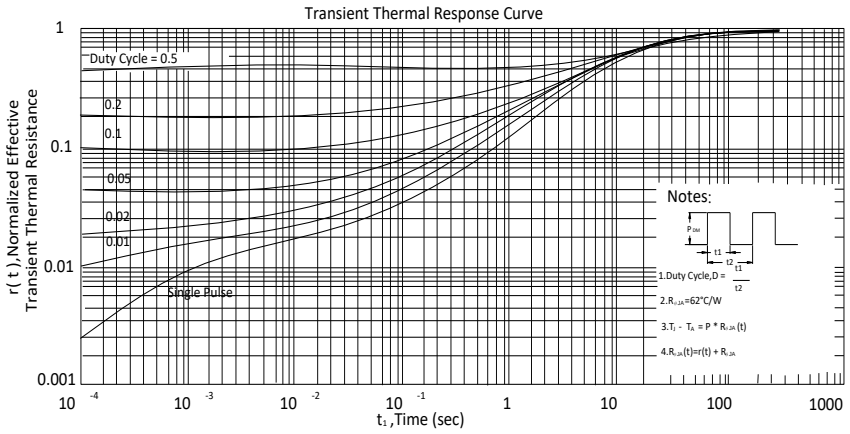



Gate Charge Characteristics
ID=8A
VDS =5V
10V
15V
VGS ,Gate-Source Voltage(V)
Qg ,Gate Charge(nC)


Capacitance Characteristics
Ciss
Coss
Crss
f = 1 MHz
VGS=0 V
C-Capacitance(pF)
VDS -Drain-Source Voltage(V)

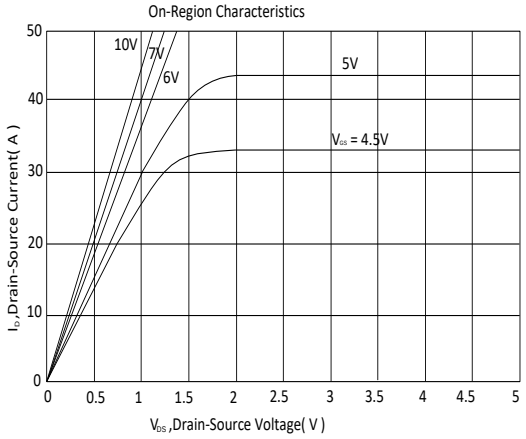

Maximum Safe Operating Area
RDS(ON) Limit
100μs
1ms
10ms
100ms
1s
10s
DC
VGS = 10V
Single Pulse
RθJA= 62°C/W
TA = 25°C
ID - Drain Current(A)
VDS - Drain-Source Voltage(V)


Single Pulse Maximum Power Dissipation
Single Pulse
RθJA = 62°C/W
TA = 25°C
P(pk),Peak Transient Power(W)
t1 ,Time (sec)

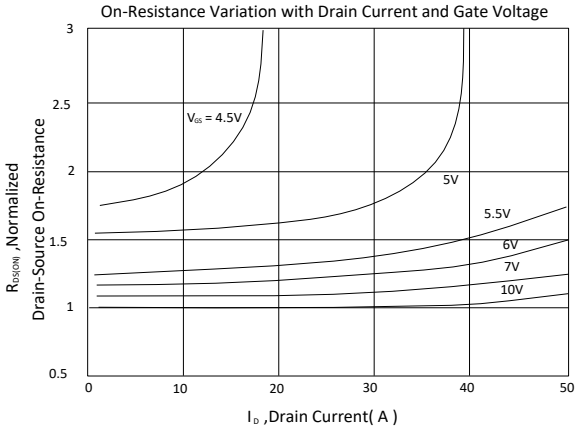

Transient Thermal Response Curve
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
Notes:
1.Duty Cycle,D =
2.RθJA=62°C/W
3.TJ - TA = P * RθJA (t)
4.RθJA(t)=r(t) + RθJA
r(t),Normalized Effective Transient Thermal Resistance
t1 ,Time (sec)

Q2 TYPICAL CHARACTERISTICS

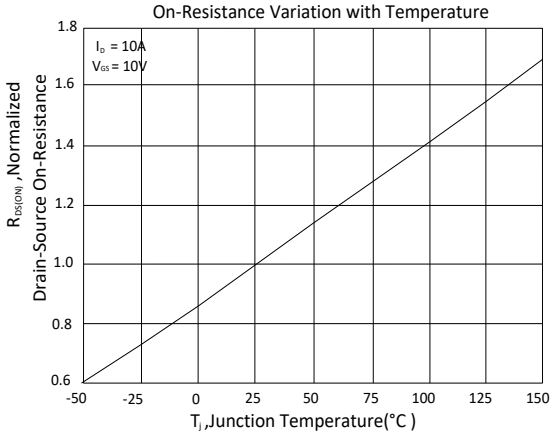
On-Region Characteristics



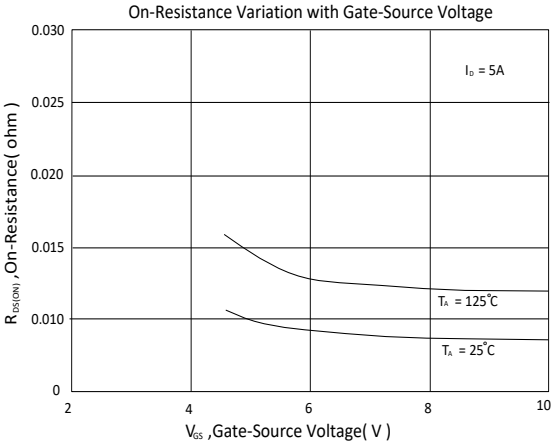
On-Resistance Variation with Drain Current and Gate Voltage



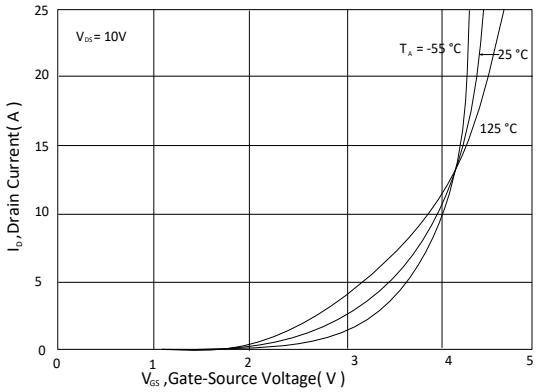
On-Resistance Variation with Temperature



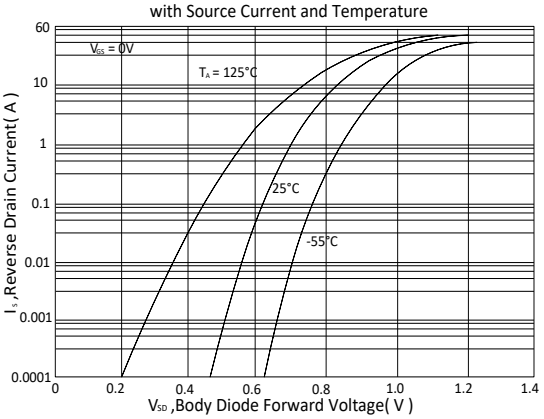
On-Resistance Variation with Gate-Source Voltage

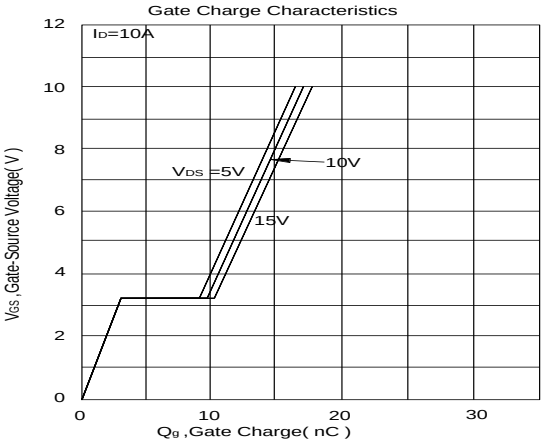


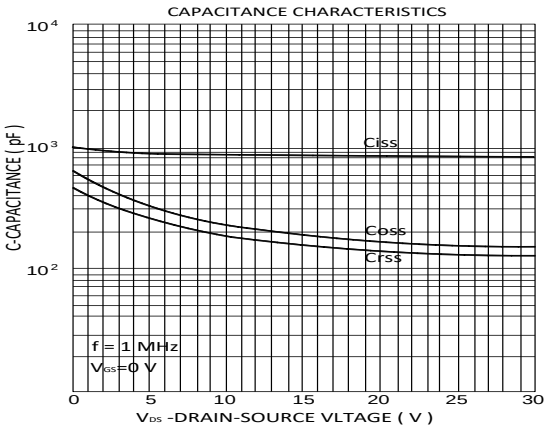
Transfer Characteristics

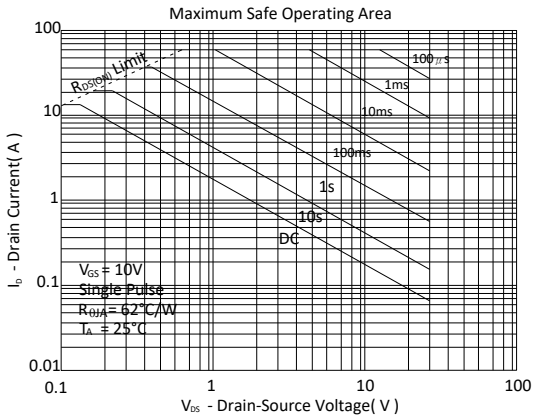


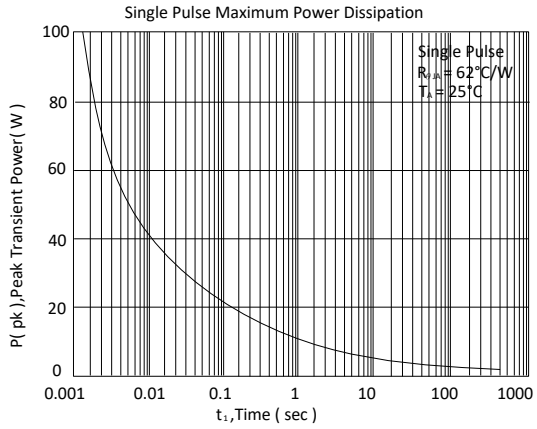
Body Diode Forward Voltage Variation
with Source Current and Temperature

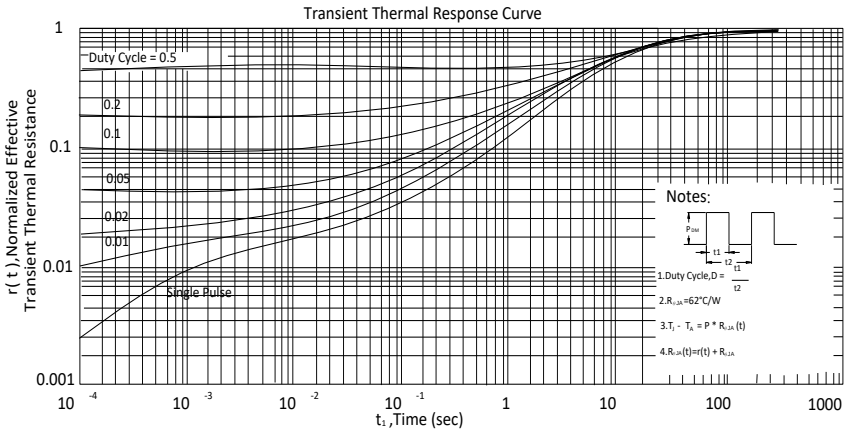



Gate Charge Characteristics
ID=10A
VDS =5V
10V
15V
VGS , Gate-Source Voltage(V)
Qg ,Gate Charge(nC)

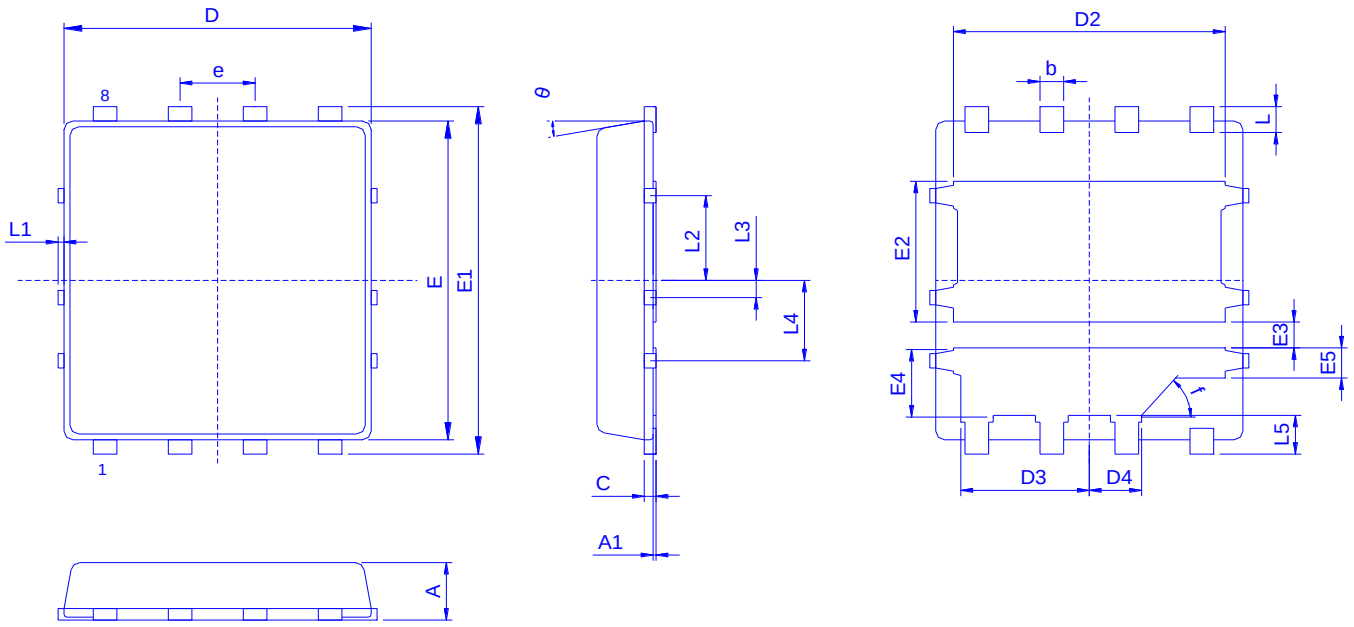

CAPACITANCE CHARACTERISTICS
Ciss
Coss
Crss
f = 1 MHz
VGS=0 V
C-CAPACITANCE (pF)
VDS -DRAIN-SOURCE VLTAGE (V)


Maximum Safe Operating Area
RDS(ON) Limit
100μs
1ms
10ms
100ms
1s
10s
DC
VGS = 10V
Single Pulse
RθJA= 62°C/W
TA = 25°C
ID - Drain Current(A)
VDS - Drain-Source Voltage(V)


Single Pulse Maximum Power Dissipation
Single Pulse
RθJA = 62°C/W
TA = 25°C
P(pk),Peak Transient Power(W)
t1 ,Time (sec)


Transient Thermal Response Curve
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
Notes:
1.Duty Cycle,D = t1/t2
2.RθJA=62°C/W
3.TJ - TA = P * RθJA (t)
4.RθJA(t)=r(t) + RθJA
r(t),Normalized Effective Transient Thermal Resistance
t1 ,Time (sec)

Outline Drawing

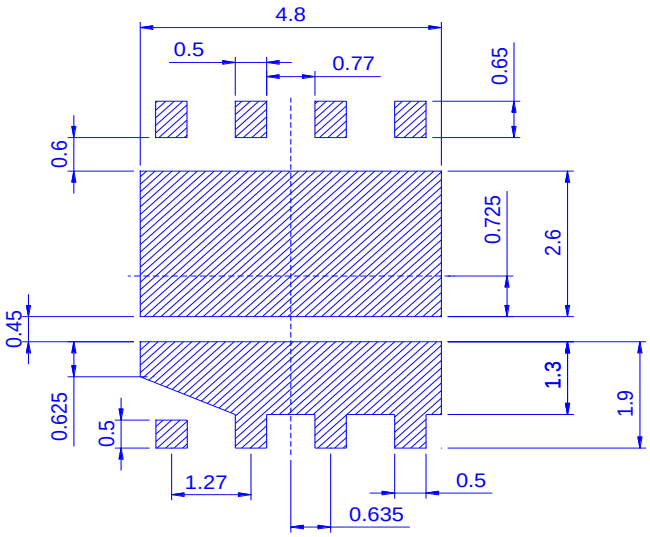


Dimension in mm

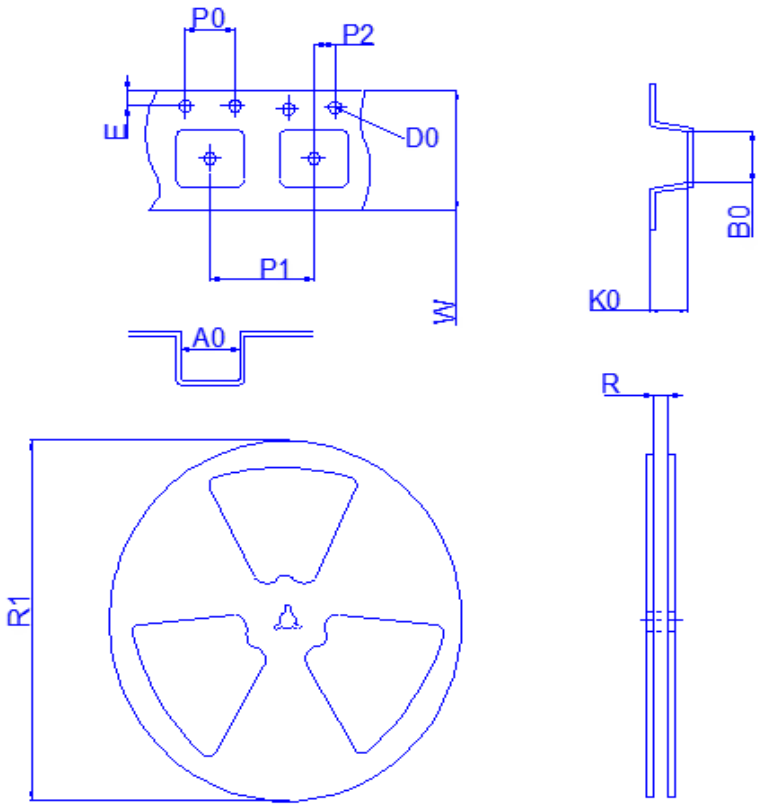
Dimension	A	A1	b	c	D	D2	D3	D4	E	E1	E2	E3	E4	E5
Min.	0.85	0.00	0.35	0.15		4.5	2.125	0.835			2.4	0.40	1.125	0.475
Typ.	0.90		0.40	0.20	5.2	4.6	2.175	0.885	5.55	6.05	2.45	0.45	1.175	0.525
Max.	1.00	0.05	0.45	0.25		4.7	2.225	0.935			2.5	0.50	1.225	0.575

Dimension	e	L	L1	L2	L3	L4	L5	F	θ
Min.		0.35	0	1.375	0.2	1.3	0.575		0°
Typ.	1.27	0.45		1.475	0.3	1.4	0.675	45°	
Max.		0.55	0.1	1.575	0.4	1.5	0.775		10°

Recommended minimum pads



Tape&Reel Information:2500pcs/Reel



Package	EDFN5X6
Reel	13"
Device orientation	FEED DIRECTION

Dimension in mm

Dimension	Carrier tape									Reel	
	A0	B0	D0	E	K0	P0	P1	P2	W	R	R1
Typ.	6.4	5.3	1.5	1.8	1.6	4.0	8.0	2.0	12.0	12.4	330.0
±	0.2	0.2	0.1	0.1	0.6	0.1	0.1	0.1	0.3	2.0	2.0