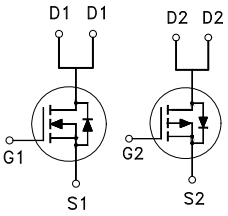
杰力科技股份有限公司
Excelliance MOS Corporation

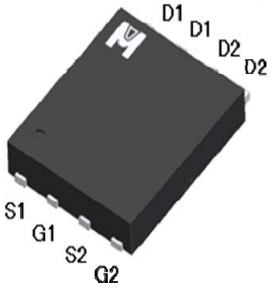
EMB22C04H

N & P-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

	N-CH	P-CH
BV_{DSS}	40V	-40V
$R_{DSON\ (MAX.)}$	22mΩ	50mΩ
I_D	33A	-22A





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}	N-CH	P-CH	V
			±20	±20	
Continuous Drain Current	T_C = 25 °C	I_D	33	-22	A
	T_C = 100 °C		21	-14	
Pulsed Drain Current[1]		I_{DM}	48	-36	
Avalanche Current		I_{AS}	25	-20	
Avalanche Energy	L = 0.1mH, I_{AS}=15A, RG=25Ω (N) L = 0.1mH, I_{AS}=-10A, RG=25Ω (P)	E_{AS}	11.25	5	mJ
Repetitive Avalanche Energy[2]	L = 0.05mH	E_{AR}	5.6	2.5	
Power Dissipation	T_C = 25 °C	P_D	41		W
	T_C = 100 °C		16		
Power Dissipation	T_A = 25 °C	P_D	2		W
	T_A = 70 °C		1.28		
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	$R_{\theta JC}$		3	°C / W
Junction-to-Ambient[3]	$R_{\theta JA}$		62.5	

[1]Pulse width limited by maximum junction temperature.

[2]Duty cycle ≤ 1%

[3]62.5°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	N-CH	40			V
		V_{GS} = 0V, I_D = -250μA	P-CH	-40			
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	N-CH	1	1.8	3	
		V_{DS} = V_{GS}, I_D = -250μA	P-CH	-1	-1.8	-3	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	N-CH			±100	nA
		V_{DS} = 0V, V_{GS} = ±20V	P-CH			±100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 32V, V_{GS} = 0V	N-CH			1	μA
		V_{DS} = -32V, V_{GS} = 0V	P-CH			-1	
		V_{DS} = 30V, V_{GS} = 0V, T_J = 125 °C	N-CH			25	
		V_{DS} = -30V, V_{GS} = 0V, T_J = 125 °C	P-CH			-25	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 10V, V_{GS} = 10V	N-CH	33			A
		V_{DS} = -5V, V_{GS} = -10V	P-CH	-22			
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 12A	N-CH		19	22	mΩ
		V_{GS} = -10V, I_D = -12A	P-CH		45	50	
		V_{GS} = 4.5V, I_D = 10A	N-CH		33	40	
		V_{GS} = -4.5V, I_D = -10A	P-CH		70	85	
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 12A	N-CH		20		S
		V_{DS} = -5V, I_D = -12A	P-CH		10		
DYNAMIC							
Input Capacitance	C_{iss}	N-CH V_{GS} = 0V, V_{DS} = 15V, f = 1MHz P=CH V_{GS} = 0V, V_{DS} = -15V, f = 1MHz	N-CH		536		pF
			P-CH		810		
Output Capacitance	C_{oss}		N-CH		83		
			P-CH		94		
Reverse Transfer Capacitance	C_{rss}		N-CH		66		
			P-CH		72		

Gate Resistance	R_g	V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz	N-CH		1.5		Ω
			P-CH		6.5		
Total Gate Charge[1,2]	Q_g	N-CH V_{DS} = 20V, V_{GS} = 10V, I_D = 12A P-CH V_{DS} = -20V, V_{GS} = -10V, I_D = -12A	N-CH		14.5		nC
			P-CH		15		
Gate-Source Charge[1,2]	Q_{gs}		N-CH		2.1		
			P-CH		2.6		
Gate-Drain Charge[1,2]	Q_{gd}		N-CH		4.3		
			P-CH		3.1		
Turn-On Delay Time[1,2]	$t_{d(on)}$	N-CH V_{DS} = 20V, I_D = 1A, V_{GS} = 10V, R_{GS} = 6Ω P-CH V_{DS} = -20V, I_D = -1A, V_{GS} = -10V, R_{GS} = 6Ω	N-CH		10		nS
			P-CH		12		
Rise Time[1,2]	t_r		N-CH		10		
			P-CH		15		
Turn-Off Delay Time[1,2]	$t_{d(off)}$		N-CH		15		
			P-CH		25		
Fall Time[1,2]	t_f		N-CH		12		
			P-CH		15		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25 °C)							
Continuous Current	I_S		N-CH			33	A
			P-CH			-22	
Pulsed Current[3]	I_{SM}		N-CH			48	
			P-CH			-36	
Forward Voltage[1]	V_{SD}	I_F = 12A, V_{GS} = 0V I_F = -12A, V_{GS} = 0V	N-CH			1.2	V
			P-CH			-1.2	

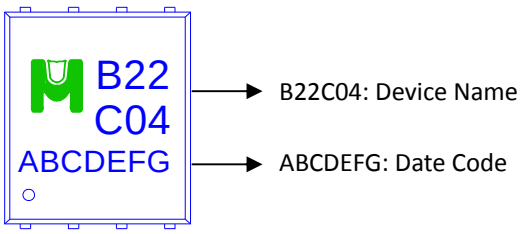
[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

[2]Independent of operating temperature.

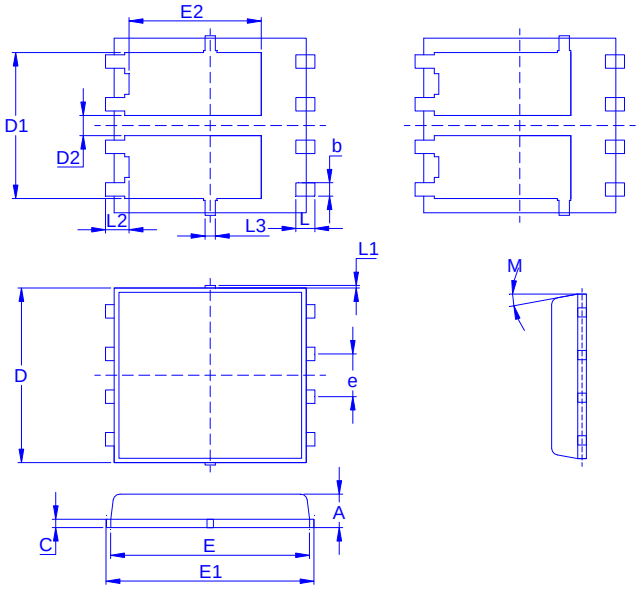
[3]Pulse width limited by maximum junction temperature.

Ordering & Marking Information:

Device Name: EMB22C04H for EDFN 5 x 6



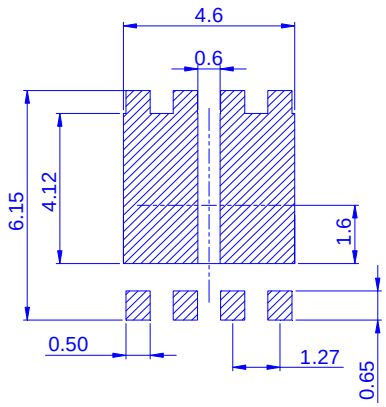
Outline Drawing



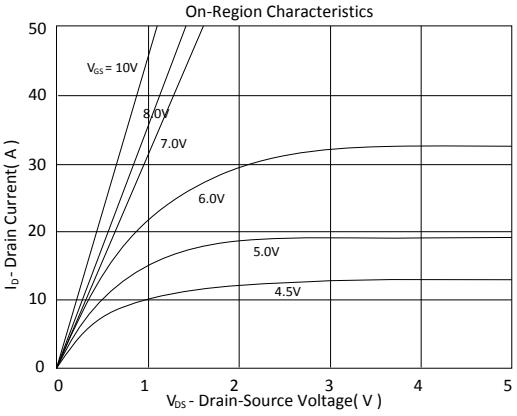
Dimension in mm

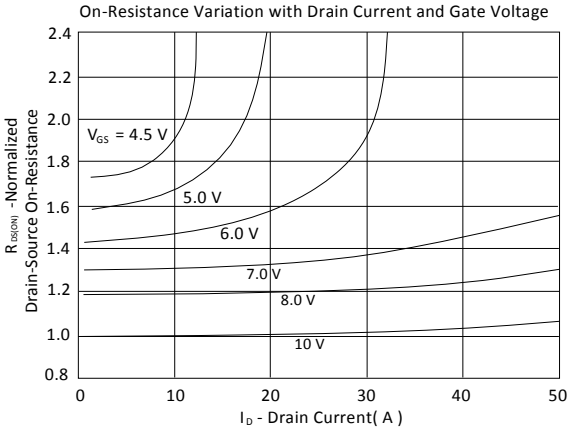
Dimension	A	b	c	D	D1	D2	E	E1	E2	e	L	L1	L2	M
Min.	0.85	0.3	0.15	4.8	3.41	0.47	5.65	5.95	3.30		0.38	0	0.38	0°
Typ.	1.01	0.4	0.2	5	4.01	0.67	5.75	6.05	3.43	1.27	0.55	0.09	0.48	
Max.	1.17	0.5	0.25	5.2	4.61	0.87	5.85	6.15	3.58		0.71	0.18	0.58	12°

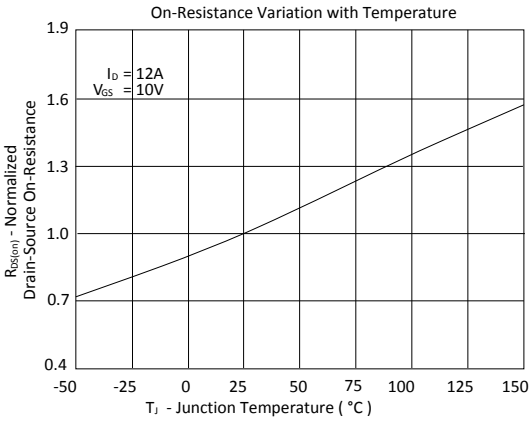
Recommended minimum pads

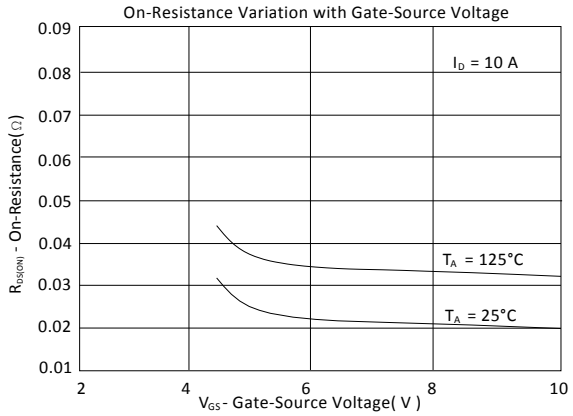


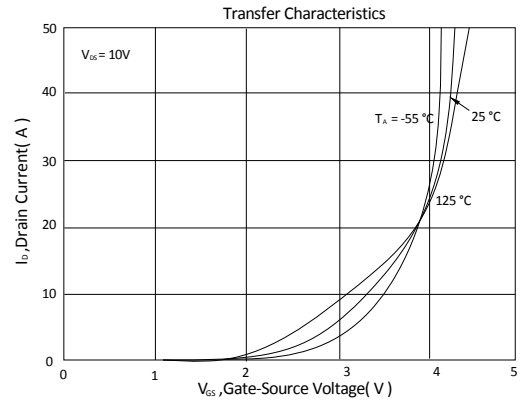
N-Channel

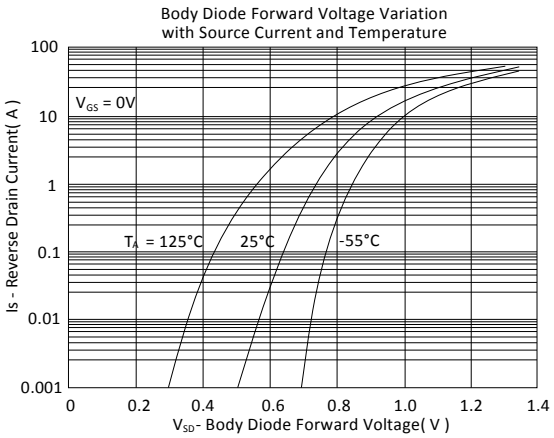

On-Region Characteristics
V_{GS} = 10V
8.0V
7.0V
6.0V
5.0V
4.5V
I_D - Drain Current(A)
V_{DS} - Drain-Source Voltage(V)

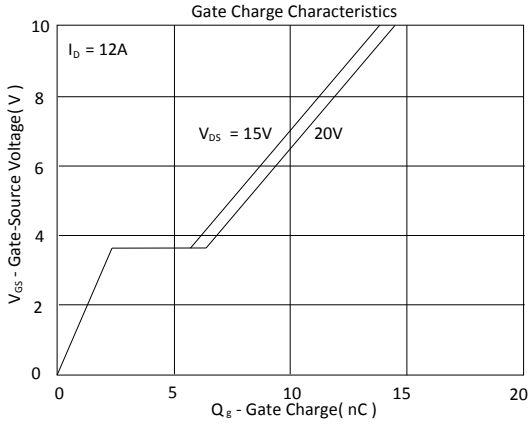

On-Resistance Variation with Drain Current and Gate Voltage
V_{GS} = 4.5 V
5.0 V
6.0 V
7.0 V
8.0 V
10 V
$R_{DS(ON)}$ -Normalized
Drain-Source On-Resistance
I_D - Drain Current(A)

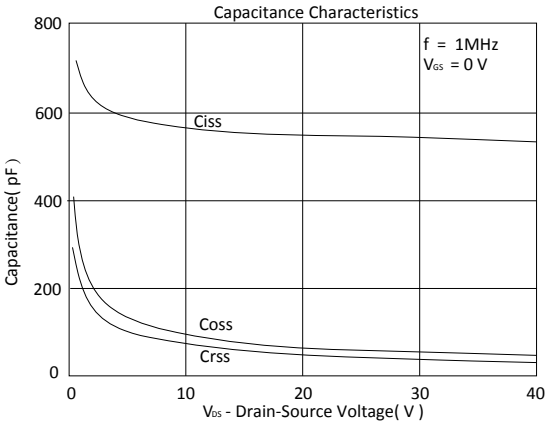

On-Resistance Variation with Temperature
I_D = 12A
V_{GS} = 10V
$R_{DS(on)}$ -Normalized
Drain-Source On-Resistance
T_J - Junction Temperature (°C)

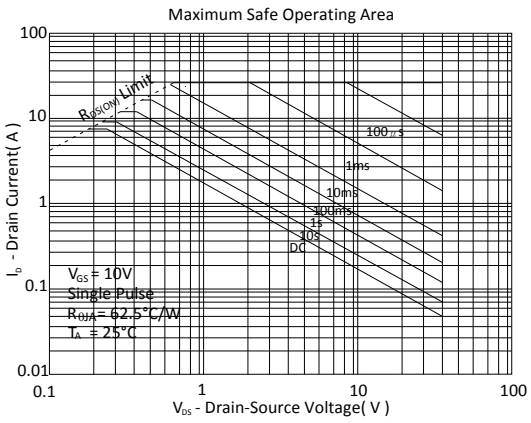

On-Resistance Variation with Gate-Source Voltage
I_D = 10 A
T_A = 125°C
T_A = 25°C
$R_{DS(ON)}$ - On-Resistance(Ω)
V_{GS} - Gate-Source Voltage(V)

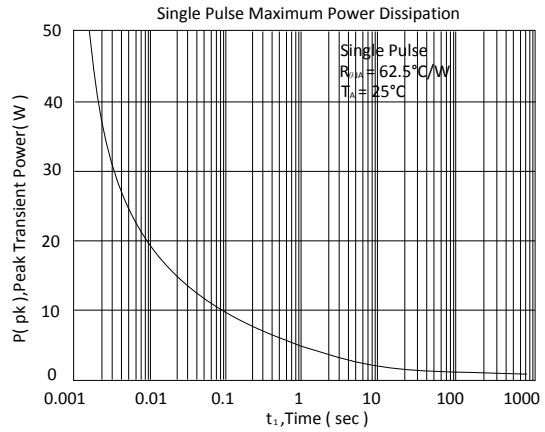

Transfer Characteristics
V_{DS} = 10V
T_A = -55 °C
25 °C
125 °C
I_D,Drain Current(A)
V_{GS} ,Gate-Source Voltage(V)

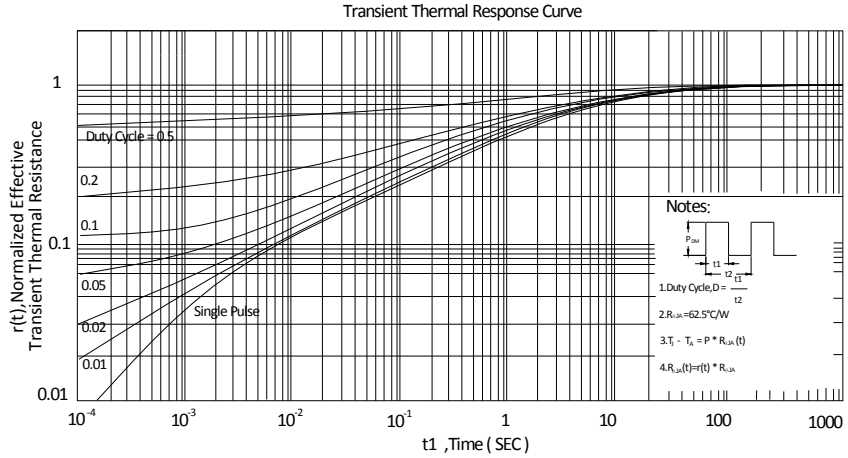

Body Diode Forward Voltage Variation
with Source Current and Temperature
V_{GS} = 0V
T_A = 125°C
25°C
-55°C
Is - Reverse Drain Current(A)
V_{SD} - Body Diode Forward Voltage(V)


Gate Charge Characteristics
I_D = 12A
V_{DS} = 15V
20V
V_{GS} - Gate-Source Voltage(V)
Q_g - Gate Charge(nC)

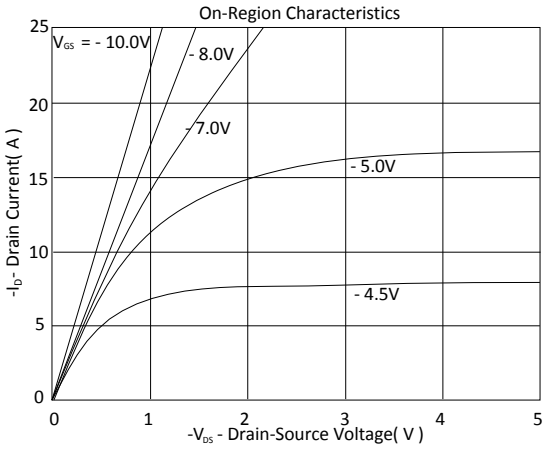

Capacitance Characteristics
f = 1MHz
V_{GS} = 0 V
Ciss
Coss
Crss
Capacitance(pF)
V_{DS} - Drain-Source Voltage(V)

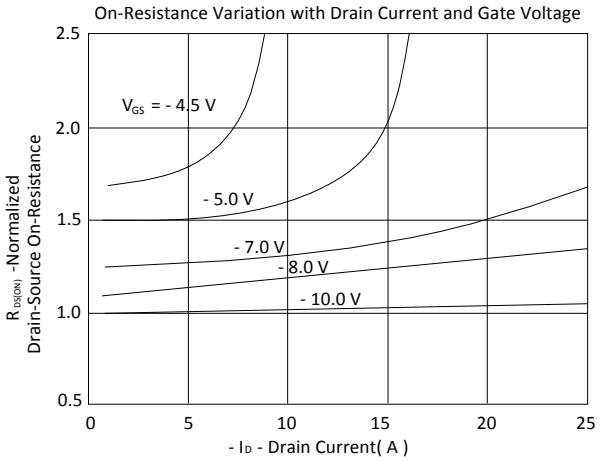

Maximum Safe Operating Area
$R_{DS(ON)}$ Limit
100μs
1ms
10ms
100ms
1s
10s
DC
V_{GS} = 10V
Single Pulse
$R_{\theta JA}$= 62.5°C/W
T_A = 25°C
I_D - Drain Current(A)
V_{DS} - Drain-Source Voltage(V)

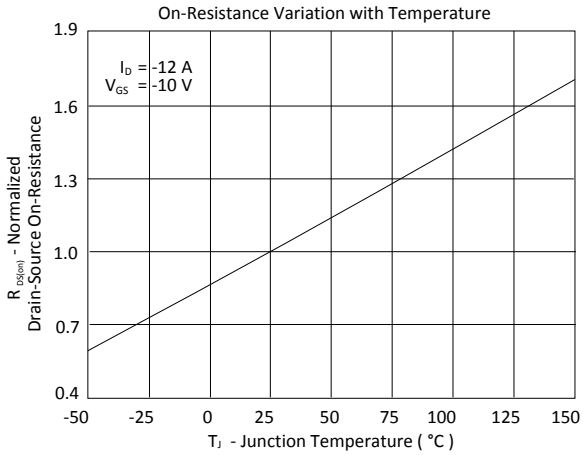

Single Pulse Maximum Power Dissipation
Single Pulse
$R_{\theta JA}$= 62.5°C/W
T_A = 25°C
P(pk),Peak Transient Power(W)
t_1 ,Time (sec)

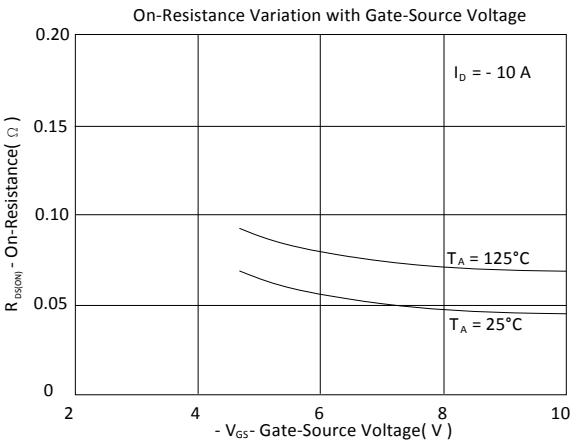

Transient Thermal Response Curve
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
Notes:
1.Duty Cycle,D = t1/t2
2.$R_{\theta JA}$=62.5°C/W
3.T_J - T_A = P * $R_{\theta JA}$ (t)
4.$R_{\theta JA}$(t)=r(t) * $R_{\theta JA}$
r(t),Normalized Effective Transient Thermal Resistance
t1 ,Time (SEC)

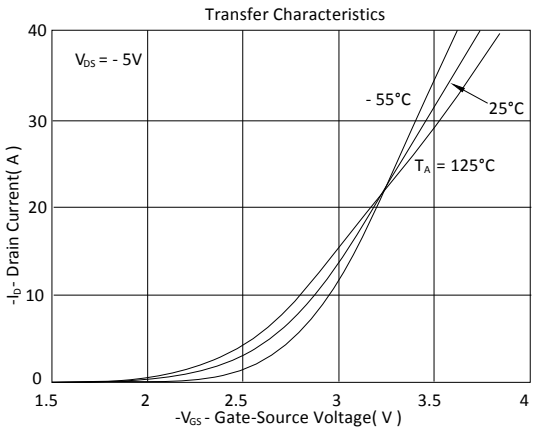
P-Channel

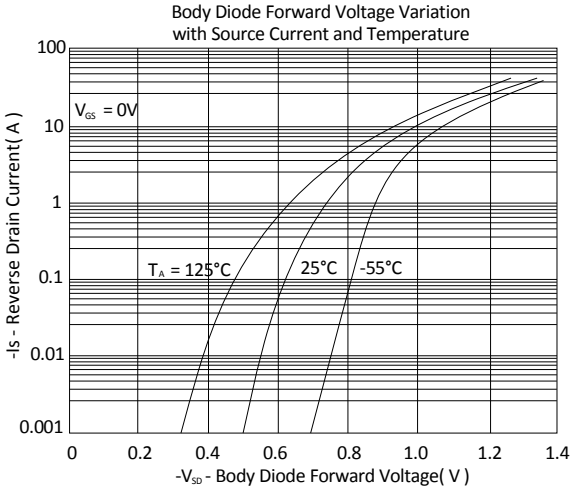

On-Region Characteristics
V_{GS} = - 10.0V
- 8.0V
- 7.0V
- 5.0V
- 4.5V
$-I_D$ - Drain Current(A)
$-V_{DS}$ - Drain-Source Voltage(V)


On-Resistance Variation with Drain Current and Gate Voltage
V_{GS} = - 4.5 V
- 5.0 V
- 7.0 V
- 8.0 V
- 10.0 V
$R_{DS(ON)}$ -Normalized
Drain-Source On-Resistance
- I_D - Drain Current(A)

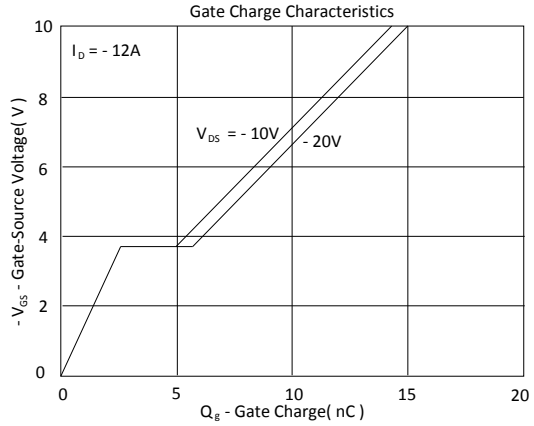

On-Resistance Variation with Temperature
I_D = -12 A
V_{GS} = -10 V
$R_{DS(on)}$ - Normalized
Drain-Source On-Resistance
T_J - Junction Temperature (°C)


On-Resistance Variation with Gate-Source Voltage
I_D = - 10 A
T_A = 125°C
T_A = 25°C
$R_{DS(ON)}$ - On-Resistance(Ω)
- V_{GS}- Gate-Source Voltage(V)

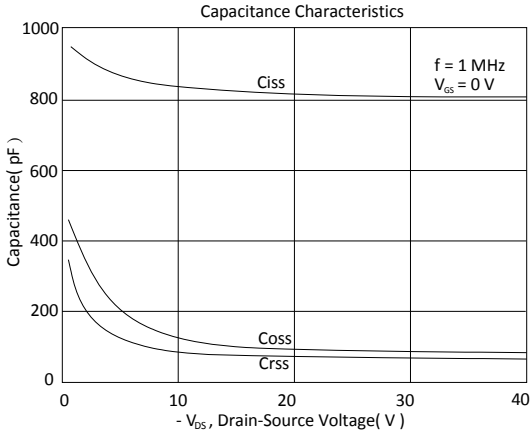

Transfer Characteristics
V_{DS} = - 5V
- 55°C
25°C
T_A = 125°C
$-I_D$- Drain Current(A)
$-V_{GS}$ - Gate-Source Voltage(V)


Body Diode Forward Voltage Variation
with Source Current and Temperature
V_{GS} = 0V
T_A = 125°C
25°C
-55°C
$-I_S$ - Reverse Drain Current(A)
$-V_{SD}$ - Body Diode Forward Voltage(V)

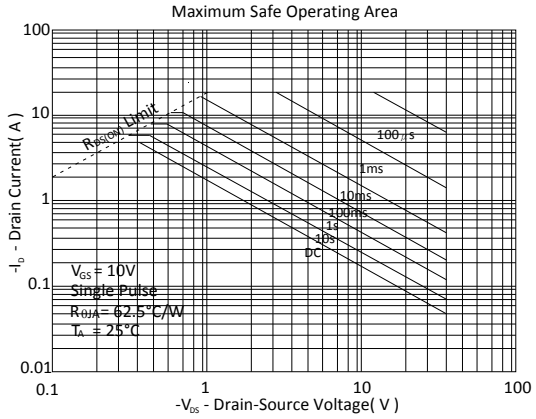
Gate Charge Characteristics



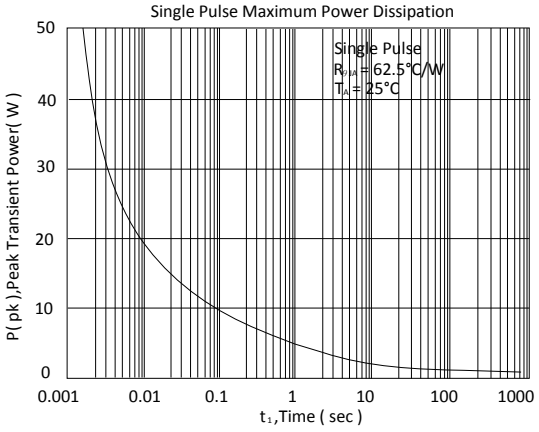
Capacitance Characteristics



Maximum Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve