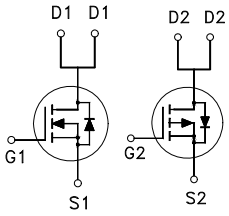
杰力科技股份有限公司
Excelliance MOS Corporation

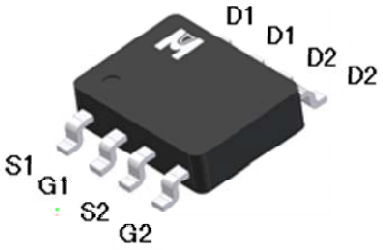
EMB50D03G

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

Product Summary:

	N-CH	P-CH
BV_{DSS}	30V	-30V
$R_{DSON\ (MAX.)}$	21mΩ	50mΩ
I_D	8A	-5A





UIS, Rg 100% Tested

Pb-Free Lead Plating & Halogen Free

GP
GREEN PRODUCT

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_A = 25 °C	I_D	8	-5	A
	T_A = 70 °C		6.4	-4	
Pulsed Drain Current[1]		I_{DM}	32	-20	
Avalanche Current		I_{AS}	10	-10	
Avalanche Energy	L = 0.1mH, ID=10A, RG=25Ω(N) L = 0.1mH, ID=-10A, RG=25Ω(P)	E_{AS}	5	5	mJ
Repetitive Avalanche Energy[2]	L = 0.05mH	E_{AR}	2.5	2.5	
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

100% UIS testing in condition of V_D=15V, L=0.1mH, V_G=10V, I_L=6A, Rated V_{DS}=30V N-CH

100% UIS testing in condition of V_D=15V, L=0.1mH, V_G=-10V, I_L=-6A, Rated V_{DS}=-30V P-CH

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNIT
Junction-to-Case	$R_{\theta JC}$		25	°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	30			V
		V_{GS} = 0V, I_D = -250μA	P-CH	-30			
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	N-CH	1	1.5	3	
		V_{DS} = V_{GS}, I_D = -250μA	P-CH	-1	-1.5	-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} = 24V, V_{GS} = 0V	N-CH			1	μA
		V_{DS} = -24V, V_{GS} = 0V	P-CH			-1	
		V_{DS} = 20V, V_{GS} = 0V, T_J = 125 °C	N-CH			25	
		V_{DS} = -20V, 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	8			A
		V_{DS} = -5V, V_{GS} = -10V	P-CH	-5			
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 8A	N-CH		17	21	mΩ
		V_{GS} = -10V, I_D = -5A	P-CH		40	50	
		V_{GS} = 4.5V, I_D = 5A	N-CH		25	30	
		V_{GS} = -4.5V, I_D = -4A	P-CH		65	80	
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 8A	N-CH		16		S
		V_{DS} = -5V, I_D = -5A	P-CH		14		
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		753		pF
			P-CH		726		
Output Capacitance	C_{oss}		N-CH		81		
			P-CH		90		
Reverse Transfer Capacitance	C_{rss}		N-CH		68		
			P-CH		76		

Gate Resistance	R_g	V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz	N-CH		1.2		Ω
			P-CH		4.5		
Total Gate Charge[1,2]	Q_g(V_{GS}=10V) Q_g(V_{GS}=-10V)	N-CH V_{DS} = 15V, V_{GS} = 10V, I_D = 8A P-CH V_{DS} = -15V, V_{GS} = -10V, I_D = -5A	N-CH		12		nC
			P-CH		11.5		
	Q_g(V_{GS}=4.5V) Q_g(V_{GS}=-4.5V)		N-CH		6		
			P-CH		5.6		
Gate-Source Charge[1,2]	Q_{gs}		N-CH		2.5		
			P-CH		2.5		
Gate-Drain Charge[1,2]	Q_{gd}		N-CH		2.2		
			P-CH		2.2		
Turn-On Delay Time[1,2]	$t_{d(on)}$	N-CH V_{DS} = 15V, I_D = 1A, V_{GS} = 10V, R_{GS} = 6Ω P-CH V_{DS} = -15V, I_D = -1A, V_{GS} = -10V, R_{GS} = 6Ω	N-CH		11		nS
			P-CH		10		
Rise Time[1,2]	t_r		N-CH		16		
			P-CH		10		
Turn-Off Delay Time[1,2]	$t_{d(off)}$		N-CH		25		
			P-CH		18		
Fall Time[1,2]	t_f		N-CH		20		
			P-CH		15		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25 °C)							
Continuous Current	I_S		N-CH			2.3	A
			P-CH			-2.3	
Pulsed Current[3]	I_{SM}		N-CH			9.2	
			P-CH			-9.2	
Forward Voltage[1]	V_{SD}	I_F = I_S, V_{GS} = 0V	N-CH			1.2	V
			P-CH			-1.2	
Reverse Recovery Time	t_{rr}	I_F = I_S, dI_F/dt = 100A / μS	N-CH		15		nS
			P-CH		15		
Reverse Recovery Charge	Q_{rr}		N-CH		3.2		nC
			P-CH		8		

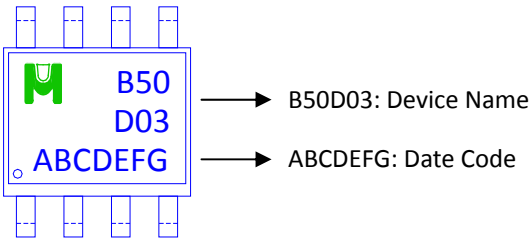
[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

[2]Independent of operating temperature.

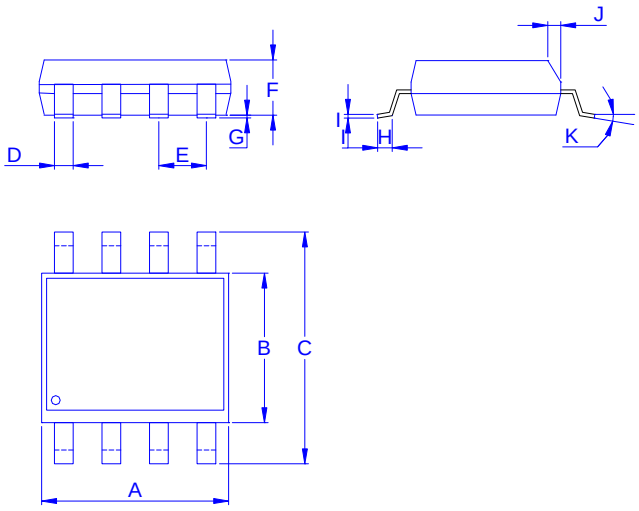
[3]Pulse width limited by maximum junction temperature.

Ordering & Marking Information:

Device Name: EMB50D03G for SOP-8



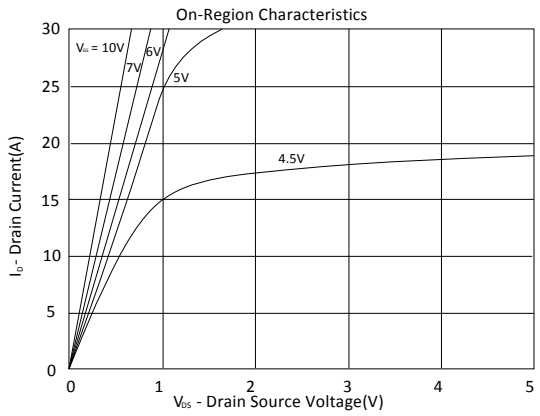
Outline Drawing

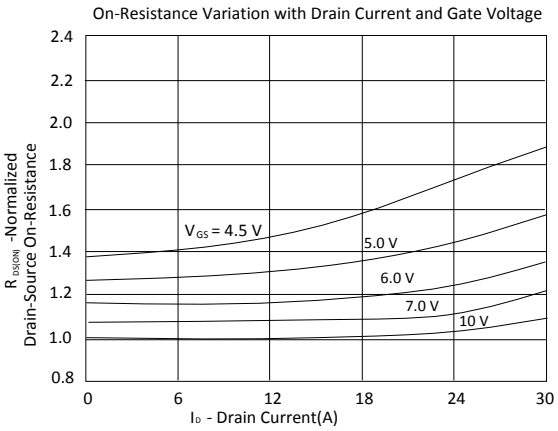


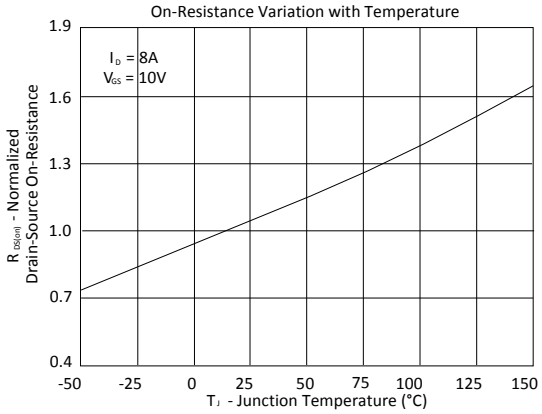
Dimension in mm

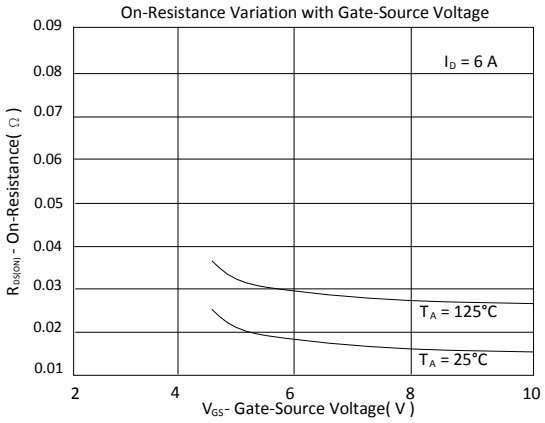
Dimension	A	B	C	D	E	F	G	H	I	J	K
Min.	4.70	3.70	5.80	0.33		1.20	0.08	0.40	0.19	0.25	0°
Typ.					1.27						
Max.	5.10	4.10	6.20	0.51		1.62	0.28	0.83	0.26	0.50	8°

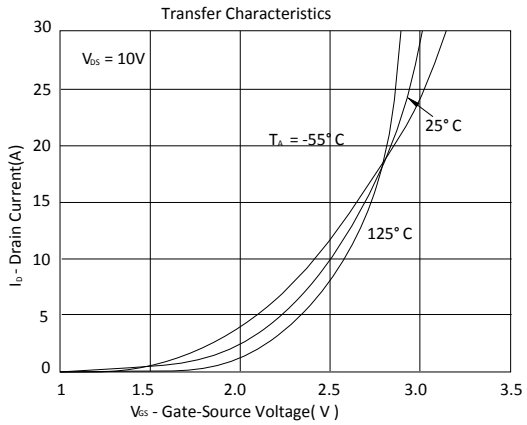
N-Channel

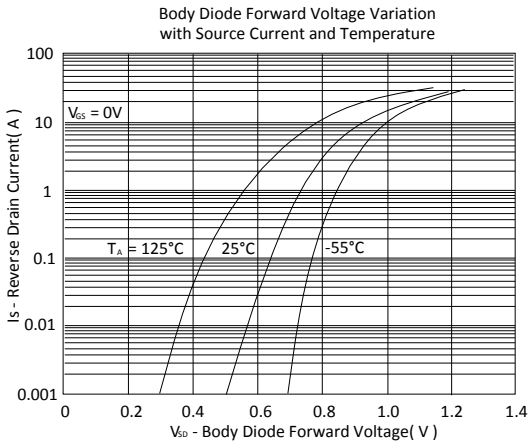

On-Region Characteristics
V_{GS} = 10V
7V
6V
5V
4.5V
I_D - Drain Current(A)
V_{DS} - Drain Source Voltage(V)

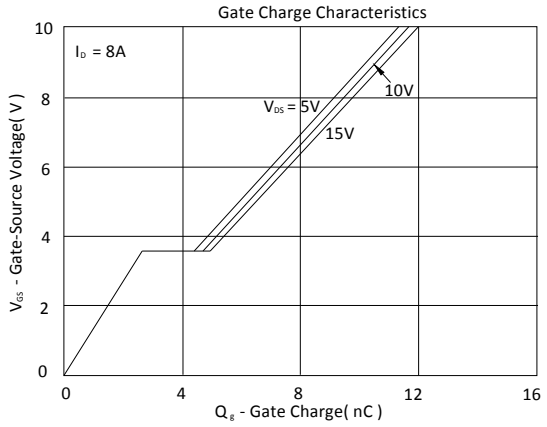

On-Resistance Variation with Drain Current and Gate Voltage
V_{GS} = 4.5 V
5.0 V
6.0 V
7.0 V
10 V
$R_{DS(ON)}$ -Normalized
Drain-Source On-Resistance
I_D - Drain Current(A)

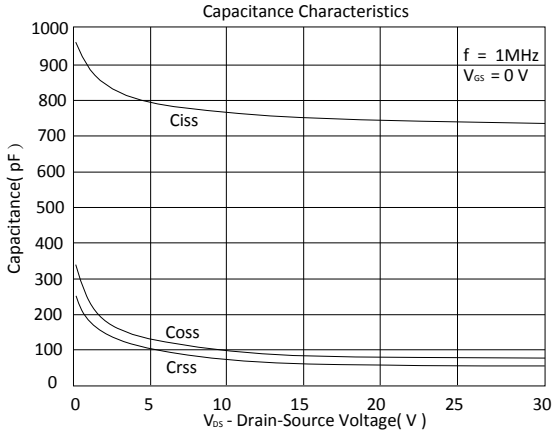

On-Resistance Variation with Temperature
I_D = 8A
V_{GS} = 10V
$R_{DS(on)}$ - Normalized
Drain-Source On-Resistance
T_J - Junction Temperature (°C)

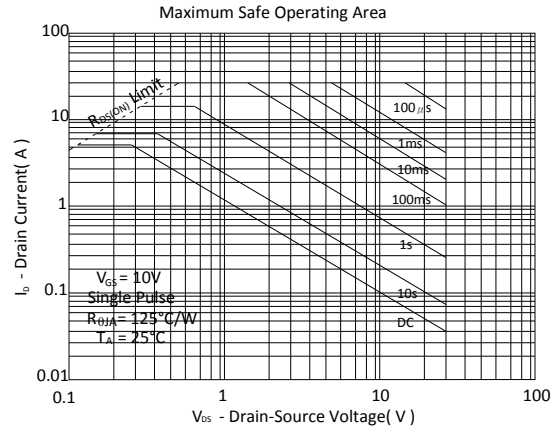

On-Resistance Variation with Gate-Source Voltage
I_D = 6 A
T_A = 125°C
T_A = 25°C
$R_{DS(ON)}$ - On-Resistance(Ω)
V_{GS}- Gate-Source Voltage(V)

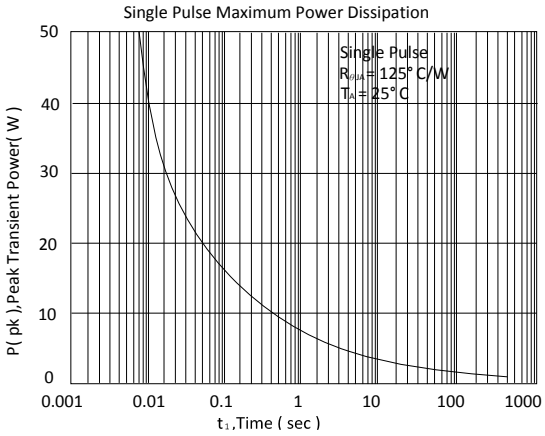

Transfer Characteristics
V_{DS} = 10V
T_A = -55° C
25° C
125° C
I_D - Drain Current(A)
V_{GS} - Gate-Source Voltage(V)

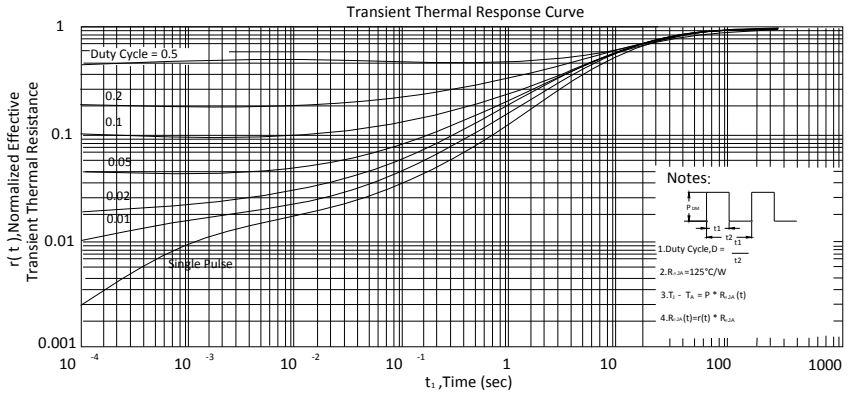

Body Diode Forward Voltage Variation
with Source Current and Temperature
V_{GS} = 0V
T_A = 125°C
25°C
-55°C
Is - Reverse Drain Current(A)
V_{SD} - Body Diode Forward Voltage(V)


Gate Charge Characteristics
I_D = 8A
V_{DS} = 5V
10V
15V
V_{GS} - Gate-Source Voltage(V)
Q_g - Gate Charge(nC)

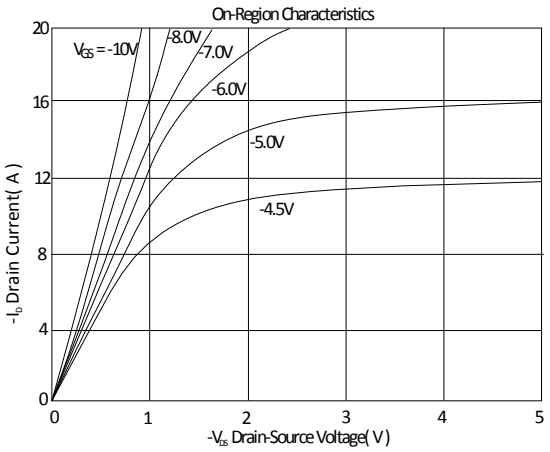

Capacitance Characteristics
f = 1MHz
V_{GS} = 0 V
Ciss
Coss
Crss
Capacitance(pF)
V_{DS} - Drain-Source Voltage(V)

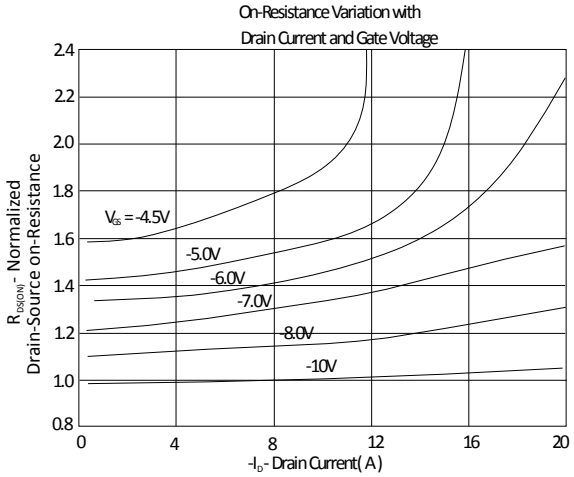

Maximum Safe Operating Area
$R_{DS(ON)}$ Limit
100 μs
1ms
10ms
100ms
1s
10s
DC
V_{GS} = 10V
Single Pulse
$R_{\theta JA}$ = 125°C/W
T_A = 25°C
I_D - Drain Current(A)
V_{DS} - Drain-Source Voltage(V)

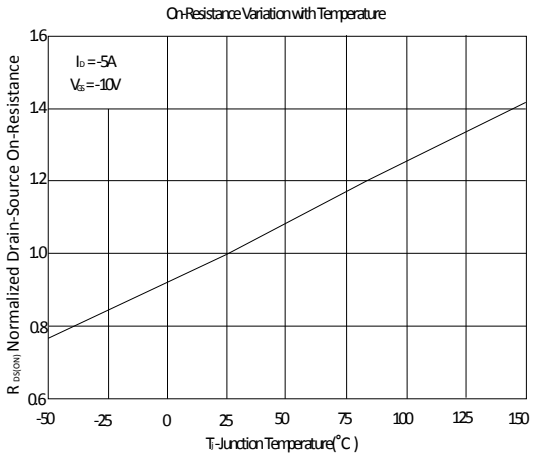

Single Pulse Maximum Power Dissipation
Single Pulse
$R_{\theta JA}$ = 125° C/W
T_A = 25°C
P(pk),Peak Transient Power(W)
t_1 ,Time (sec)

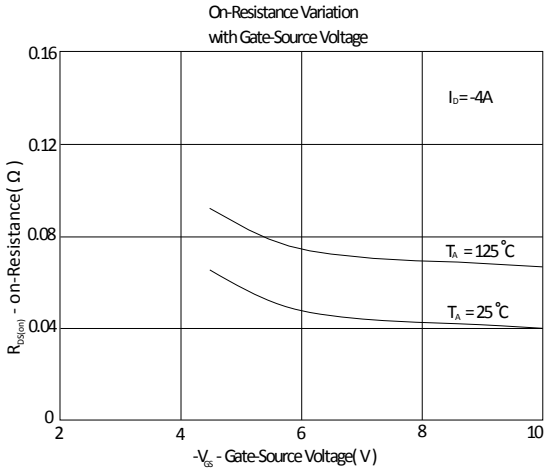

Transient Thermal Response Curve
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
Notes:
1.Duty Cycle,D =
2.$R_{\theta JA}$=125°C/W
3.T_J - T_A = P * $R_{\theta JA}$ (t)
4.$R_{\theta JA}$(t)=r(t) * $R_{\theta JA}$
r(t),Normalized Effective Transient Thermal Resistance
t_1 ,Time (sec)

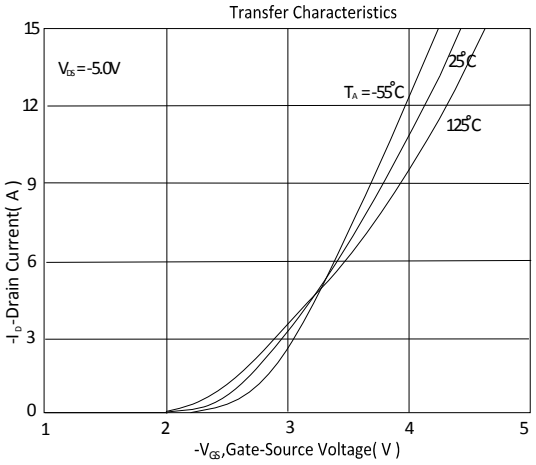
P-Channel

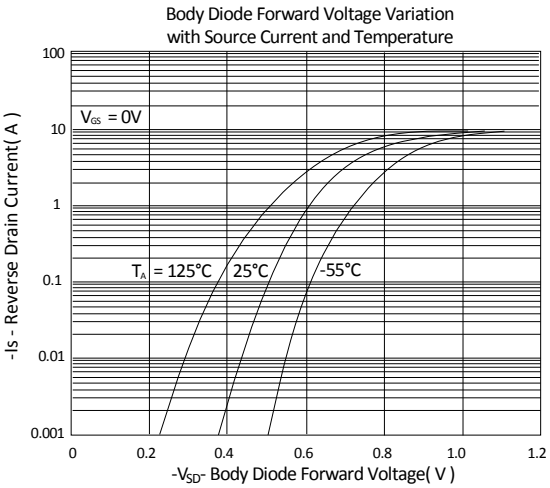

On-Region Characteristics
V_{GS} = -10V
-8.0V
-7.0V
-6.0V
-5.0V
-4.5V
$-I_D$ Drain Current(A)
$-V_{DS}$ Drain-Source Voltage(V)

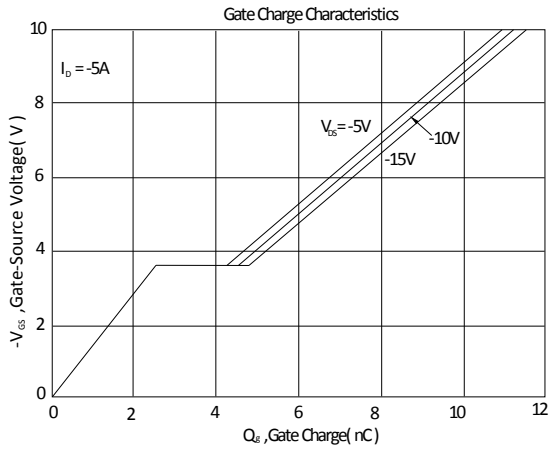

On-Resistance Variation with
Drain Current and Gate Voltage
V_{GS} = -4.5V
-5.0V
-6.0V
-7.0V
-8.0V
-10V
$R_{DS(ON)}$ - Normalized
Drain-Source on-Resistance
$-I_D$ - Drain Current(A)

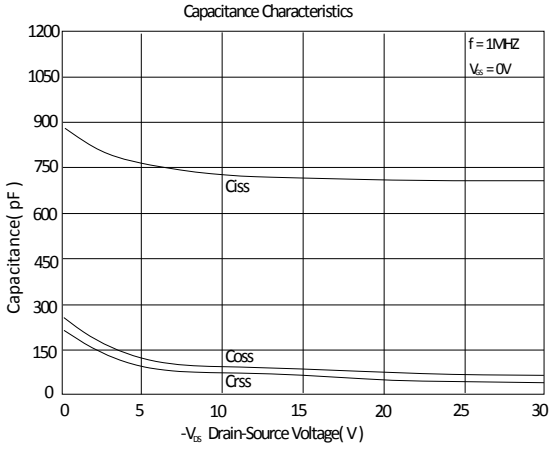

On-Resistance Variation with Temperature
I_D = -5A
V_{GS} = -10V
$R_{DS(ON)}$ Normalized Drain-Source On-Resistance
Tj-Junction Temperature(°C)

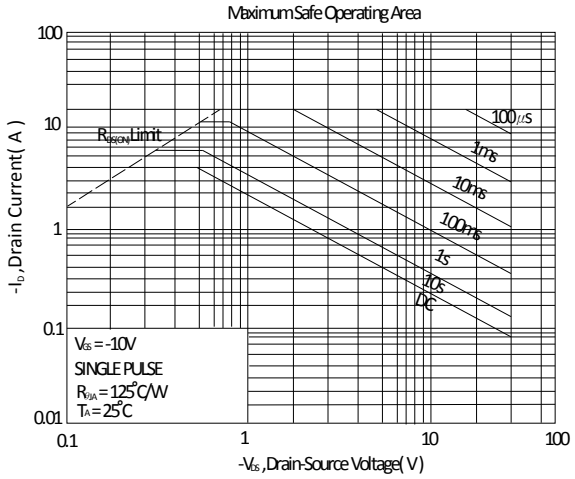

On-Resistance Variation
with Gate-Source Voltage
I_D = -4A
T_A = 125°C
T_A = 25°C
$R_{DS(on)}$ - on-Resistance(Ω)
$-V_{GS}$ - Gate-Source Voltage(V)

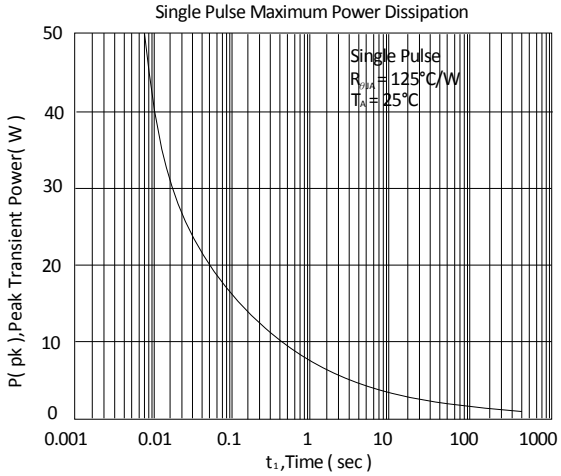

Transfer Characteristics
V_{DS} = -5.0V
25°C
T_A = -55°C
125°C
$-I_D$-Drain Current(A)
$-V_{GS}$,Gate-Source Voltage(V)

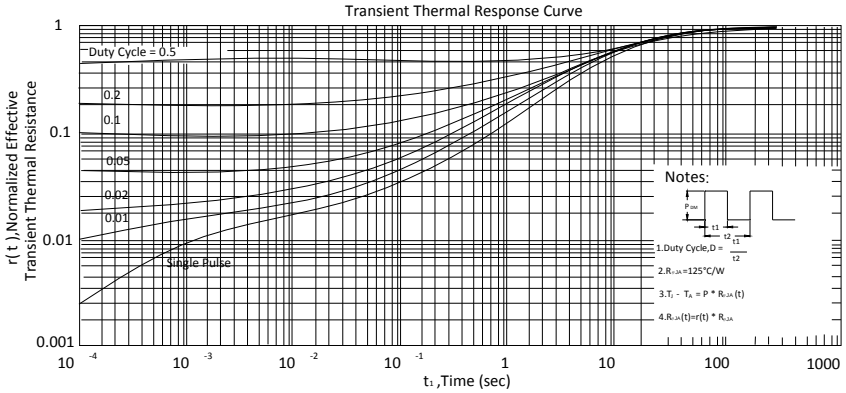

Body Diode Forward Voltage Variation
with Source Current and Temperature
V_{GS} = 0V
T_A = 125°C
25°C
-55°C
-Is - Reverse Drain Current(A)
$-V_{SD}$- Body Diode Forward Voltage(V)


Gate Charge Characteristics
I_D = -5A
V_{DS} = -5V
-10V
-15V
$-V_{GS}$,Gate-Source Voltage(V)
Q_g ,Gate Charge(nC)


Capacitance Characteristics
f = 1MHZ
V_{GS} = 0V
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
$R_{\theta JA}$ = 125°C/W
T_A = 25°C
$-I_D$,Drain Current(A)
$-V_{DS}$,Drain-Source Voltage(V)


Single Pulse Maximum Power Dissipation
Single Pulse
$R_{\theta JA}$ = 125°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 =
2.$R_{\theta JA}$ =125°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
t_1 ,Time (sec)