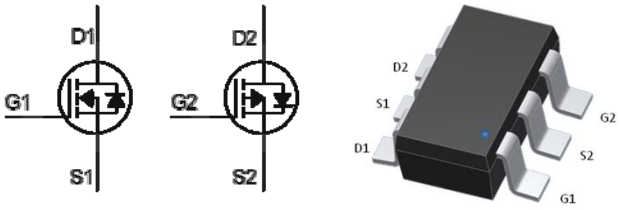
N & P-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

	N-CH	P-CH
BV_{DSS}	20V	-20V
$R_{DSON\ (MAX.)}$	30.5mΩ	100mΩ
I_D	5A	-3.2A



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
			±12	±12	
Continuous Drain Current	T_A = 25 °C	I_D	5	-3.2	A
	T_A = 100 °C		3.5	-2.5	
Pulsed Drain Current[1]		I_{DM}	20	-12.8	
Power Dissipation	T_A = 25 °C	P_D	1.25		W
	T_A = 70 °C		0.8		
Operating Junction & Storage Temperature Range		T_j, T_{stg}	-55 to 150		°C

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNIT
Junction-to-Ambient	$R_{\theta JA}$		100	°C / W

[1]Pulse width limited by maximum junction temperature.

[2]Duty cycle ≤ 1%

ELECTRICAL CHARACTERISTICS (T_C = 25 °C, Unless Otherwise Noted)

PARAMETER	SYMBOL	TEST CONDITIONS		LIMITS MIN	LIMITS TYP	LIMITS MAX	UNIT
STATIC							
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	N-CH	20			V
		V_{GS} = 0V, I_D = -250μA	P-CH	-20			
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	N-CH	0.4	0.75	1.2	
		V_{DS} = V_{GS}, I_D = -250μA	P-CH	-0.4	-0.75	-1.2	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±12V	N-CH			±100	nA
		V_{DS} = 0V, V_{GS} = ±12V	P-CH			±100	
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 16V, V_{GS} = 0V	N-CH			1	μA
		V_{DS} = -16V, V_{GS} = 0V	P-CH			-1	
		V_{DS} = 16V, V_{GS} = 0V, T_J = 125 °C	N-CH			10	
		V_{DS} = -16V, V_{GS} = 0V, T_J = 125 °C	P-CH			-10	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 5V, V_{GS} = 4.5V	N-CH	5			A
		V_{DS} = -5V, V_{GS} = -4.5V	P-CH	-3.2			
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 5A	N-CH		26	30.5	mΩ
		V_{GS} = -4.5V, I_D = -3A	P-CH		85	100	
		V_{GS} = 2.5V, I_D = 3A	N-CH		40	50	
		V_{GS} = -2.5V, I_D = -1A	P-CH		120	150	
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 5A	N-CH		7		S
		V_{DS} = -5V, I_D = -3A	P-CH		4.5		
DYNAMIC							
Input Capacitance	C_{iss}	N-CH	N-CH		280		pF
		V_{GS} = 0V, V_{DS} = 15V, f = 1MHz	P-CH		382		
Output Capacitance	C_{oss}	P-CH	N-CH		47		
		V_{GS} = 0V, V_{DS} = -15V, f = 1MHz	P-CH		70		
Reverse Transfer Capacitance	C_{rss}		N-CH		38		
			P-CH		60		
Gate Resistance	R_g	V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz	N-CH		2.0		Ω
			P-CH		5.0		

Total Gate Charge[1,2]	Q_g	N-CH V_{DS} = 10V, V_{GS} = 4.5V, I_D = 5A P-CH V_{DS} = -10V, V_{GS} = -4.5V, I_D = -3A	N-CH		6.2		nC
			P-CH		7.2		
Gate-Source Charge[1,2]	Q_{gs}		N-CH		0.9		
			P-CH		1.2		
Gate-Drain Charge[1,2]	Q_{gd}		N-CH		2.1		
			P-CH		2.3		
Turn-On Delay Time[1,2]	$t_{d(on)}$	N-CH V_{DS} = 10V, I_D = 1A, V_{GS} = 4.5V, R_{GS} = 6Ω P-CH V_{DS} = -10V, I_D = -1A, V_{GS} = -4.5V, R_{GS} = 6Ω	N-CH		5		nS
			P-CH		5		
Rise Time[1,2]	t_r		N-CH		10		
			P-CH		12		
Turn-Off Delay Time[1,2]	$t_{d(off)}$		N-CH		20		
			P-CH		23		
Fall Time[1,2]	t_f		N-CH		8		
			P-CH		10		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25 °C)							
Continuous Current	I_S		N-CH			2	A
			P-CH			-2	
Pulsed Current[3]	I_{SM}		N-CH			8	
			P-CH			-8	
Forward Voltage[1]	V_{SD}	I_F = I_S, V_{GS} = 0V	N-CH			1.3	V
			P-CH			-1.3	

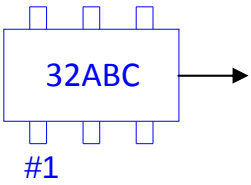
[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

[2]Independent of operating temperature.

[3]Pulse width limited by maximum junction temperature.

Ordering & Marking Information:

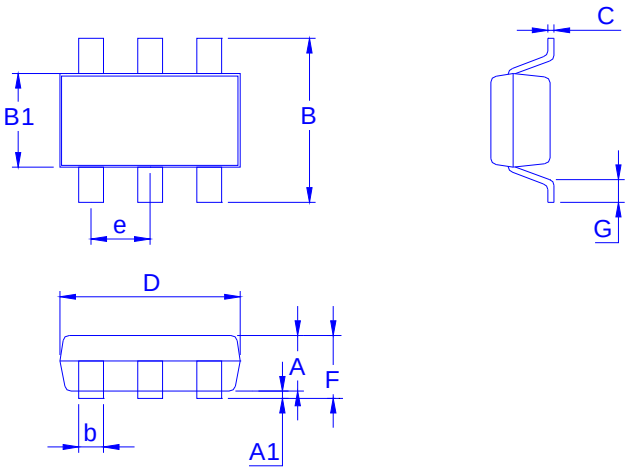
Device Name: EMF30C02K for TSOP-6



32: Device Code, 32 for EMF30C02K

ABC: Date Code

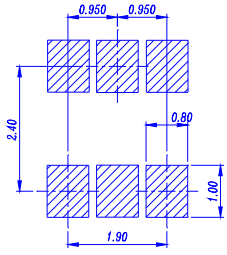
Outline Drawing



Dimension in mm

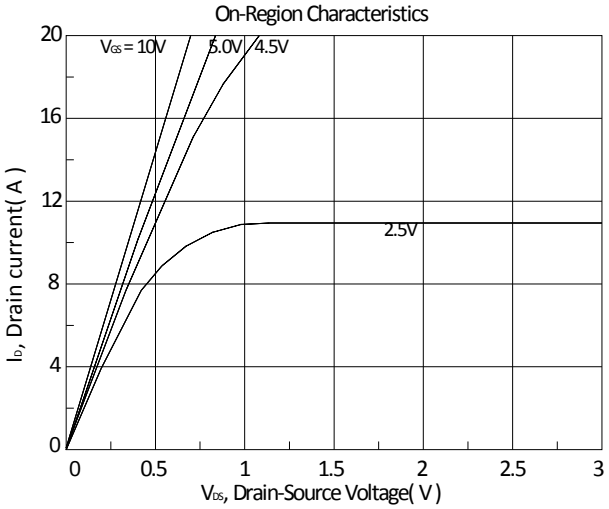
Dimension	A	A1	B	B1	b	C	D	e	F	G
Min.	0.85	0	2.50	1.50	0.30	0.08	2.70		0.85	0.20
Typ.	0.95		2.80	1.60	0.40		2.90	0.95		
Max.	1.25	0.15	3.10	1.70	0.50	0.20	3.10		1.40	0.60

Footprint

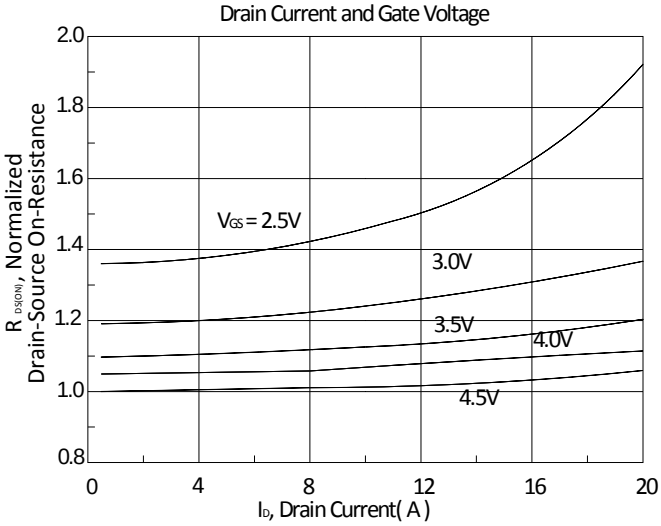


N-Channel

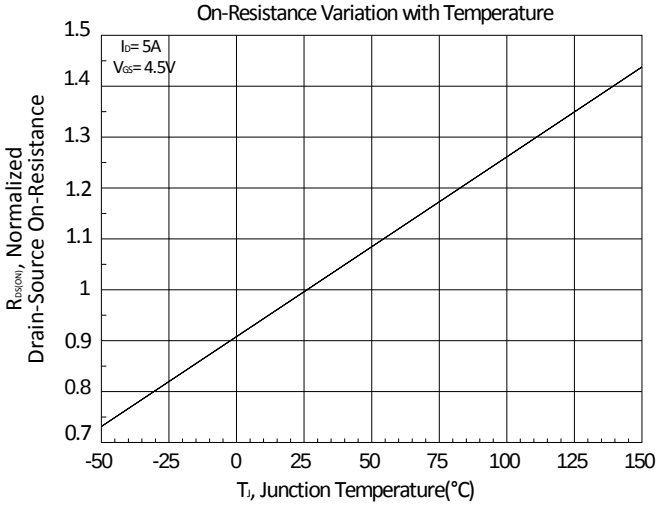
On-Region Characteristics



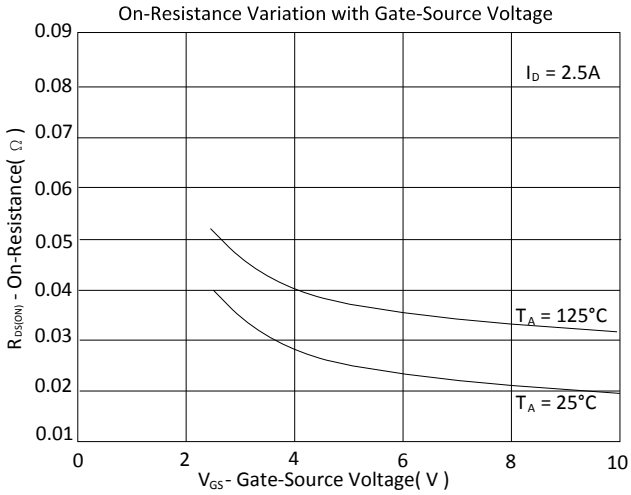
On-Resistance Variation with Drain Current and Gate Voltage



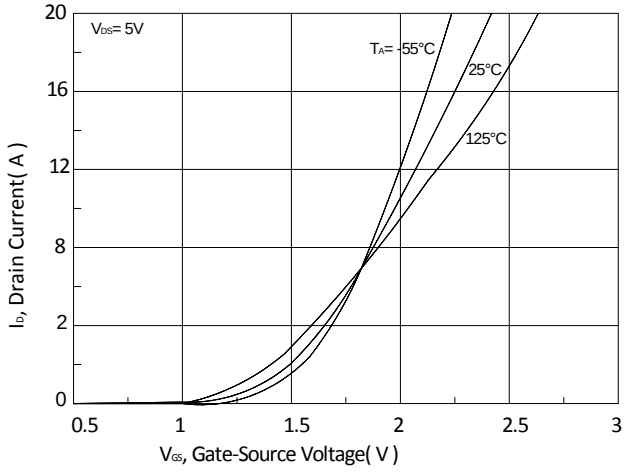
On-Resistance Variation with Temperature



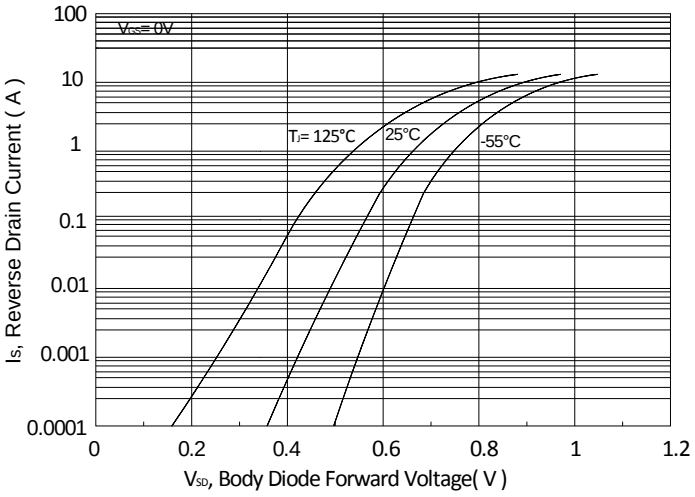
On-Resistance Variation with Gate-Source Voltage

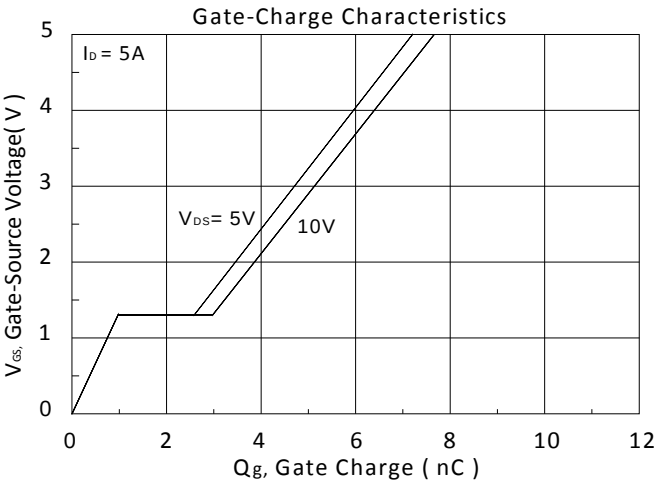


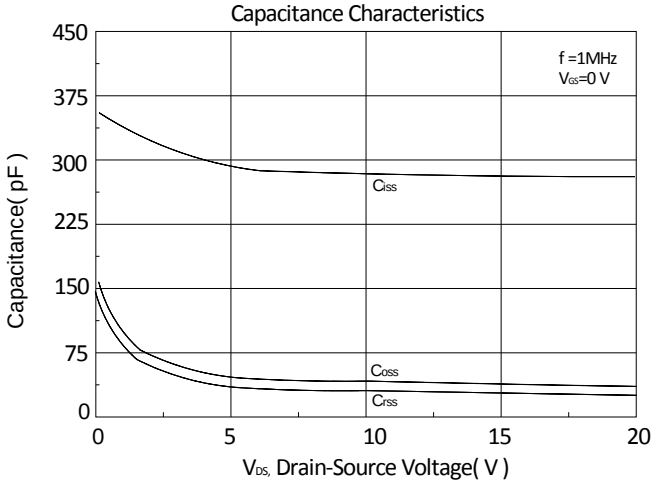
Transfer Characteristics

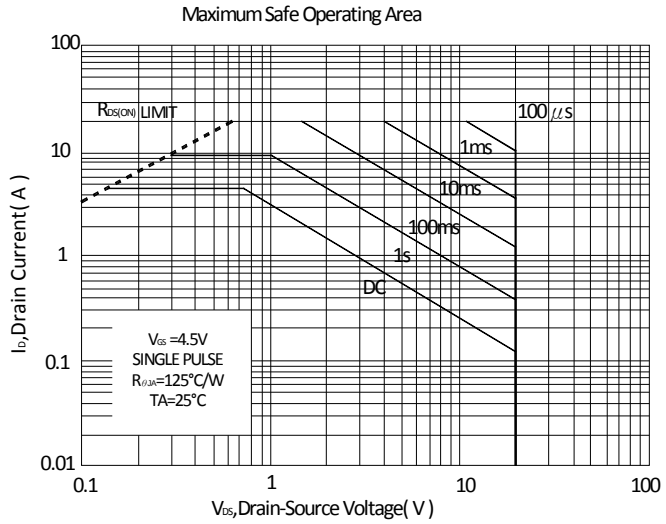


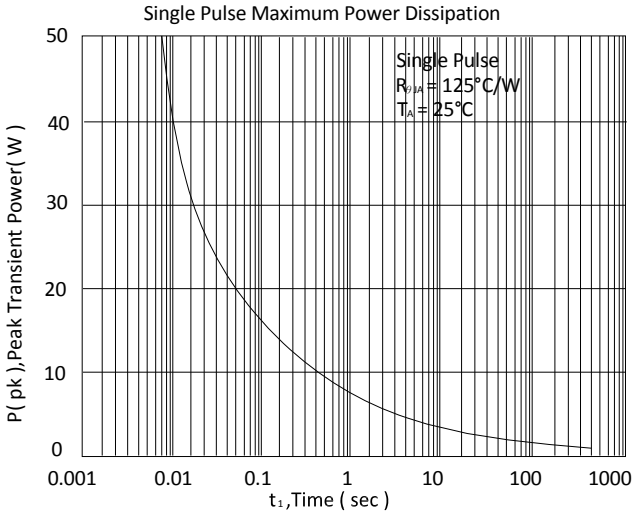
Body Diode Forward Voltage Variation with Source Current and Temperature

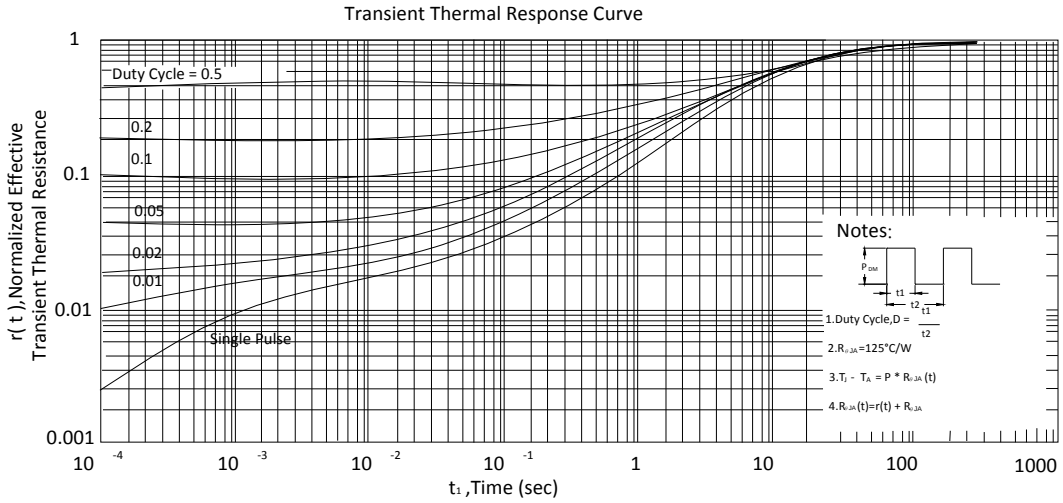



Gate-Charge Characteristics
ID = 5A
VDS= 5V
10V
VGS, Gate-Source Voltage(V)
Qg, Gate Charge (nC)

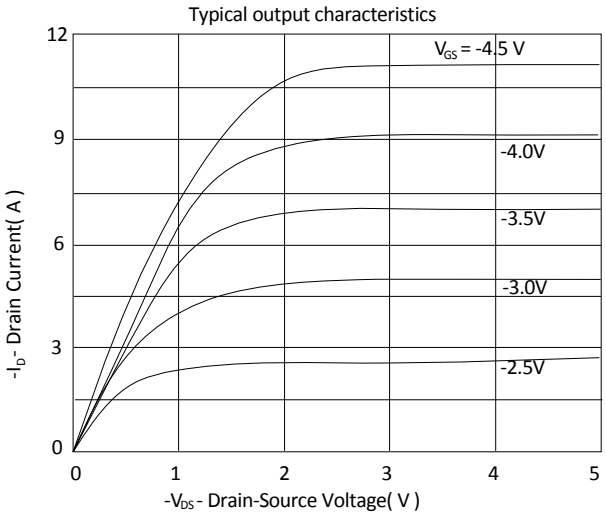

Capacitance Characteristics
f =1MHz
VGS=0 V
Ciss
Coss
Crss
Capacitance(pF)
VDS, Drain-Source Voltage(V)

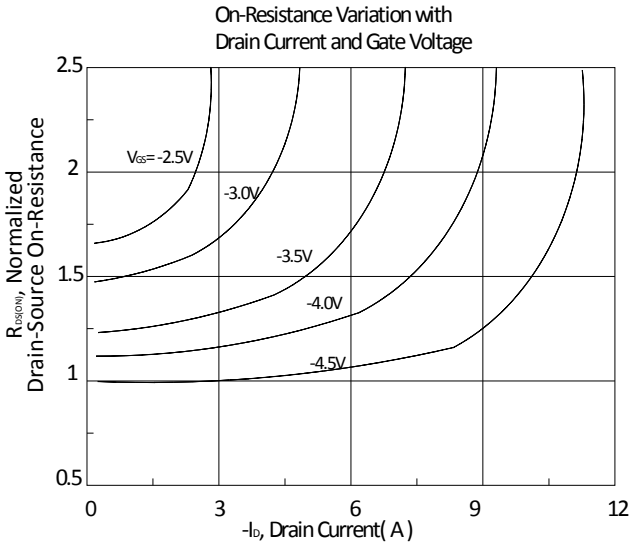

Maximum Safe Operating Area
RDS(ON) LIMIT
100 μs
1ms
10ms
100ms
1s
DC
VGS =4.5V
SINGLE PULSE
RθJA=125°C/W
TA=25°C
ID,Drain Current(A)
VDS,Drain-Source Voltage(V)

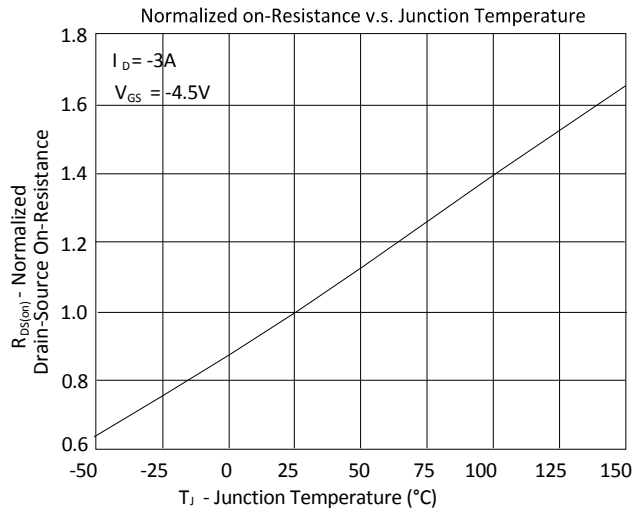

Single Pulse Maximum Power Dissipation
Single Pulse
RθJA = 125°C/W
TA = 25°C
P(pk),Peak Transient Power(W)
t1 ,Time (sec)

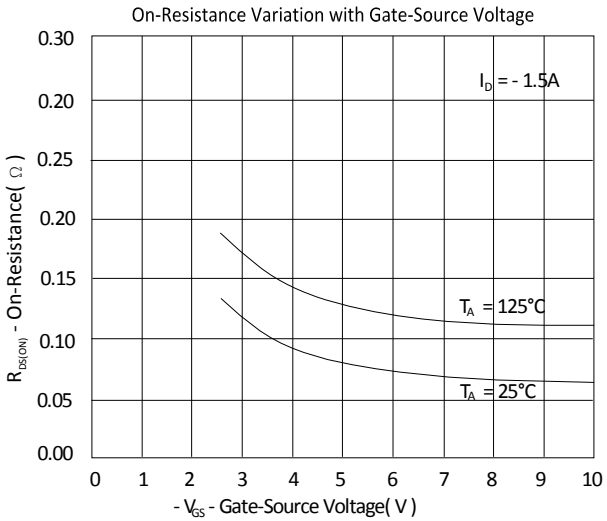

Transient Thermal Response Curve
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
Notes:
1.Duty Cycle,D =
2.RθJA=125°C/W
3.TJ - TA = P * RθJA (t)
4.RθJA(t)=r(t) + RθJA
r(t),Normalized Effective Transient Thermal Resistance
t1 ,Time (sec)

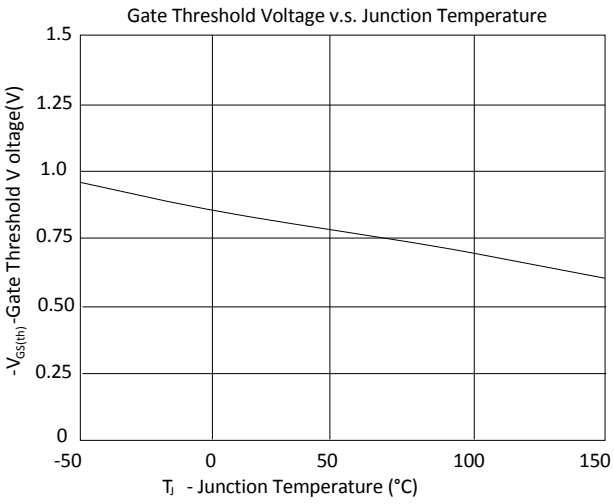
P-Channel

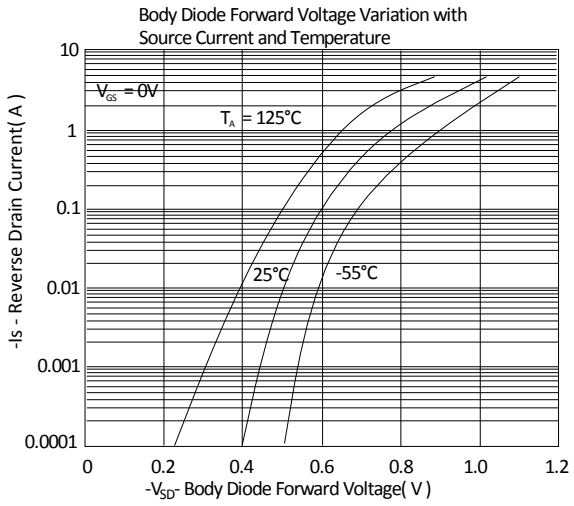

Typical output characteristics
V_{GS} = -4.5 V
-4.0V
-3.5V
-3.0V
-2.5V
$-I_D$ - Drain Current(A)
$-V_{DS}$ - Drain-Source Voltage(V)


On-Resistance Variation with
Drain Current and Gate Voltage
V_{GS}= -2.5V
-3.0V
-3.5V
-4.0V
-4.5V
$R_{DS(ON)}$, Normalized
Drain-Source On-Resistance
$-I_D$, Drain Current(A)

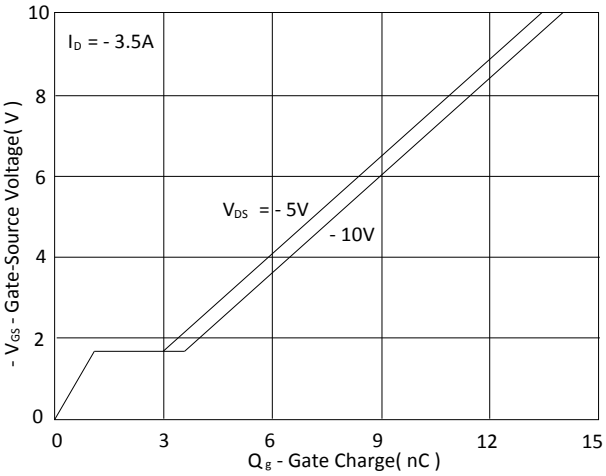

Normalized on-Resistance v.s. Junction Temperature
I_D = -3A
V_{GS} = -4.5V
$R_{DS(on)}$ - Normalized
Drain-Source On-Resistance
T_J - Junction Temperature (°C)


On-Resistance Variation with Gate-Source Voltage
I_D = - 1.5A
T_A = 125°C
T_A = 25°C
$R_{DS(ON)}$ - On-Resistance(Ω)
- V_{GS} - Gate-Source Voltage(V)

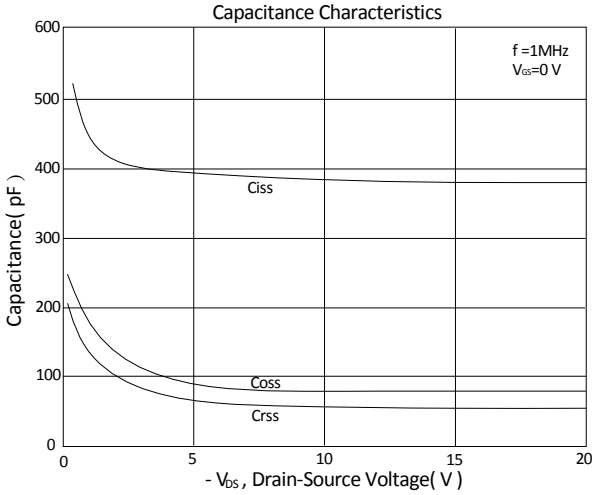

Gate Threshold Voltage v.s. Junction Temperature
$-V_{GS(th)}$ -Gate Threshold V oltage(V)
T_J - Junction Temperature (°C)


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)

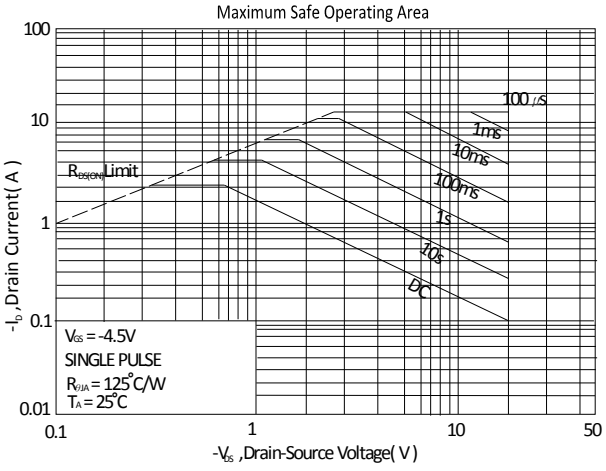
Gate Charge Characteristics



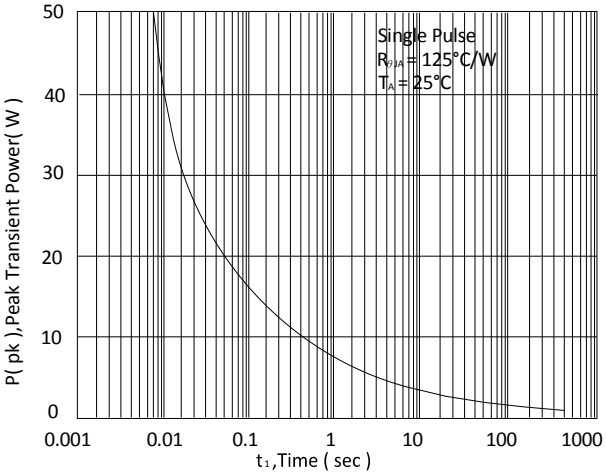
Capacitance Characteristics



Maximum Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve