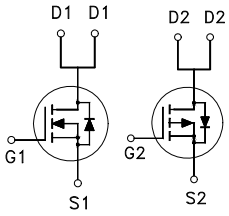
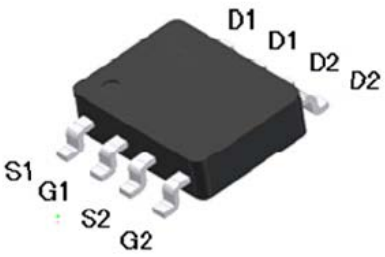
N & P-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

	N-CH	P-CH
BV_{DSS}	20V	-20V
$R_{DSON\ (MAX.)}$	20mΩ	40mΩ
I_D	6A	-5A





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
			±12	±12	
Continuous Drain Current	T_A = 25 °C	I_D	6	-5	A
	T_A = 100 °C		4	-3.3	
Pulsed Drain Current[1]		I_{DM}	24	-20	
Avalanche Current		I_{AS}	6	-5	
Avalanche Energy	L = 0.1mH, ID=6A, RG=25Ω(N) L = 0.1mH, ID=-5A, RG=25Ω(P)	E_{AS}	1.8	1.25	mJ
Repetitive Avalanche Energy[2]	L = 0.05mH	E_{AR}	0.9	0.625	
Power Dissipation	T_A = 25 °C	P_D	2		W
	T_A = 100 °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-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_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	0.45	0.75	1.2	
		V_{DS} = V_{GS}, I_D = -250μA	P-CH	-0.45	-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	6			A
		V_{DS} = -5V, V_{GS} = -4.5V	P-CH	-5			
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 6A	N-CH		18	20	mΩ
		V_{GS} = -4.5V, I_D = -5A	P-CH		37	44	
		V_{GS} = 2.5V, I_D = 5A	N-CH		23	28	
		V_{GS} = -2.5V, I_D = -4A	P-CH		55	70	
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 6A	N-CH		8		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		560		pF
			P-CH		679		
Output Capacitance	C_{oss}		N-CH		166		
			P-CH		124		
Reverse Transfer Capacitance	C_{rss}		N-CH		150		
			P-CH		106		

Gate Resistance	R_g	V_{GS} = 15mV, V_{DS} = 0V, f = 1MHz	N-CH		2.0	3.0	Ω
			P-CH		4.4	6.6	
Total Gate Charge[1,2]	Q_g	N-CH V_{DS} = 10V, V_{GS} = 4.5V, I_D = 6A P-CH V_{DS} = -10V, V_{GS} = -4.5V, I_D = -5A	N-CH		8.5		nC
			P-CH		12.8		
Gate-Source Charge[1,2]	Q_{gs}		N-CH		1.5		
			P-CH		2.2		
Gate-Drain Charge[1,2]	Q_{gd}		N-CH		3.5		
			P-CH		4.1		
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		12		nS
			P-CH		10		
Rise Time[1,2]	t_r		N-CH		15		
			P-CH		18		
Turn-Off Delay Time[1,2]	$t_{d(off)}$		N-CH		30		
			P-CH		32		
Fall Time[1,2]	t_f		N-CH		13		
			P-CH		22		
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			1.3	V
			P-CH			-1.3	

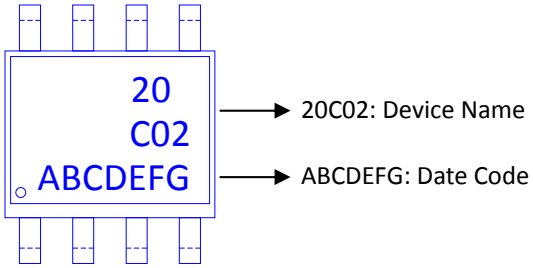
[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

[2]Independent of operating temperature.

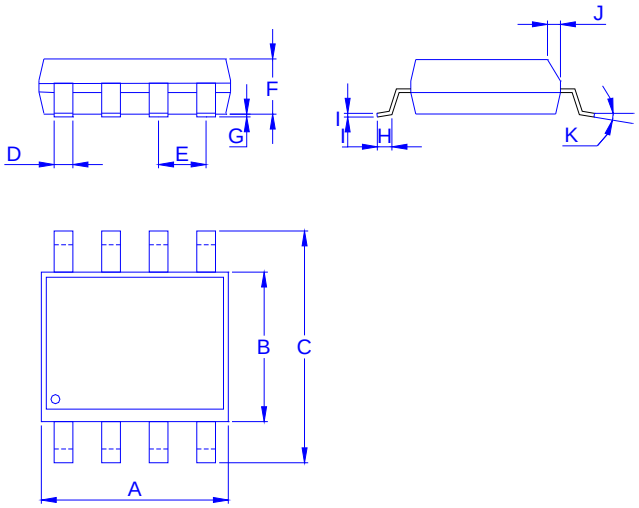
[3]Pulse width limited by maximum junction temperature.

Ordering & Marking Information:

Device Name: LB20C02H for SOP-8



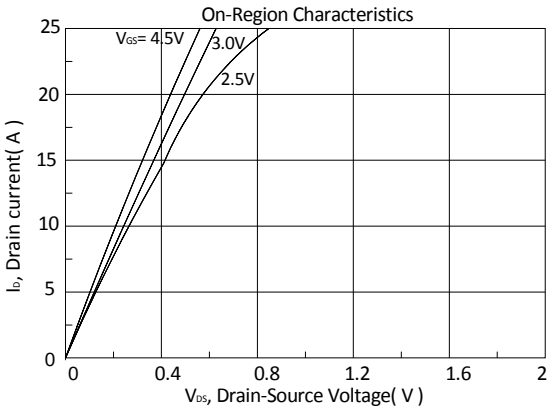
Outline Drawing

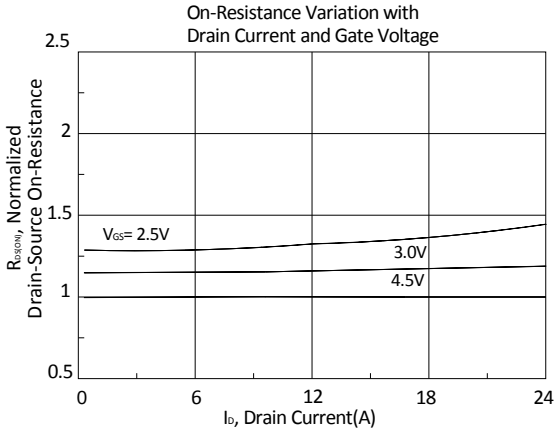


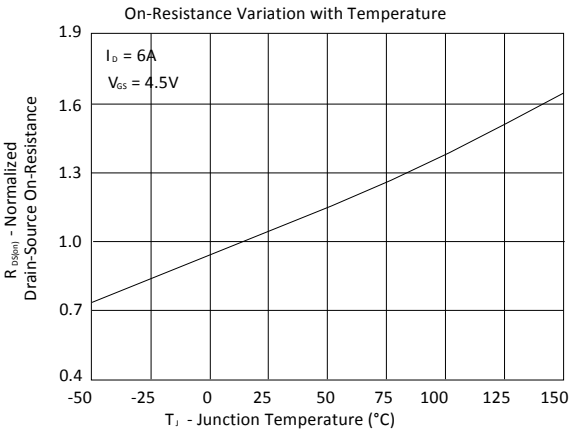
Dimension in mm

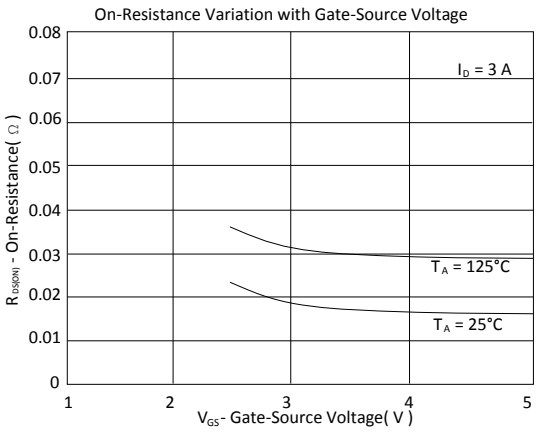
Dimension	A	B	C	D	E	F	G	H	I	J	K
Min.	4.70	3.70	5.80	0.33		1.20	0.08	0.40	0.19	0.25	0°
Typ.					1.27						
Max.	5.10	4.10	6.20	0.51		1.62	0.28	0.83	0.26	0.50	8°

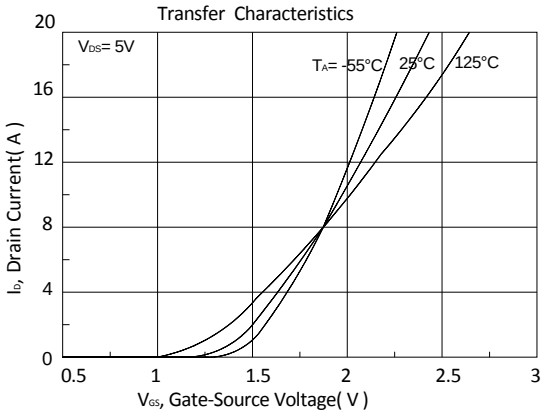
N-Channel

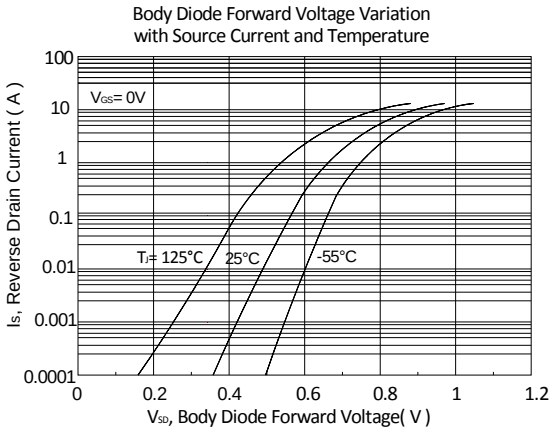

On-Region Characteristics
VGS= 4.5V
3.0V
2.5V
ID, Drain current(A)
VDS, Drain-Source Voltage(V)

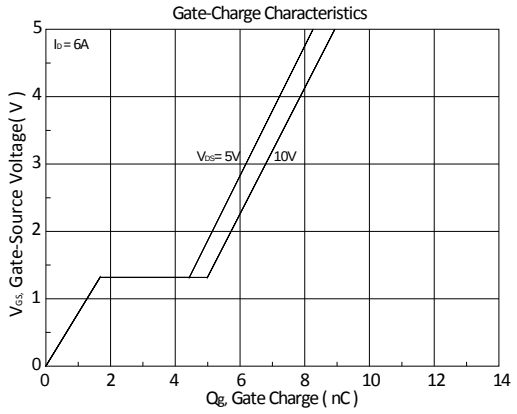

On-Resistance Variation with
Drain Current and Gate Voltage
RDS(ON), Normalized
Drain-Source On-Resistance
VGS= 2.5V
3.0V
4.5V
ID, Drain Current(A)

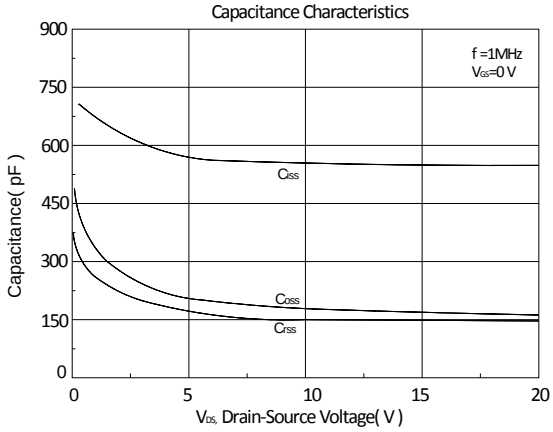

On-Resistance Variation with Temperature
ID = 6A
VGS = 4.5V
RDS(on) - Normalized
Drain-Source On-Resistance
TJ - Junction Temperature (°C)

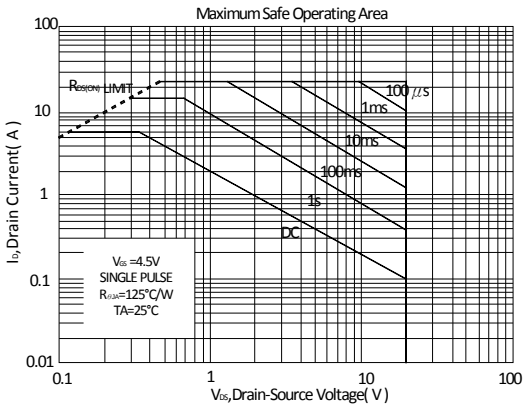

On-Resistance Variation with Gate-Source Voltage
ID = 3 A
TA = 125°C
TA = 25°C
RDS(ON) - On-Resistance(Ω)
VGS- Gate-Source Voltage(V)

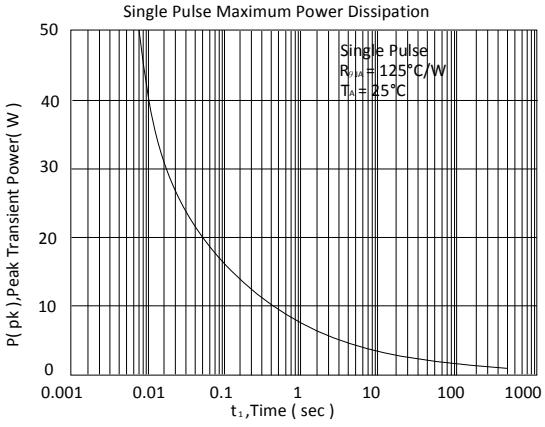

Transfer Characteristics
VDS= 5V
TA= -55°C
25°C
125°C
ID, Drain Current(A)
VGS, Gate-Source Voltage(V)

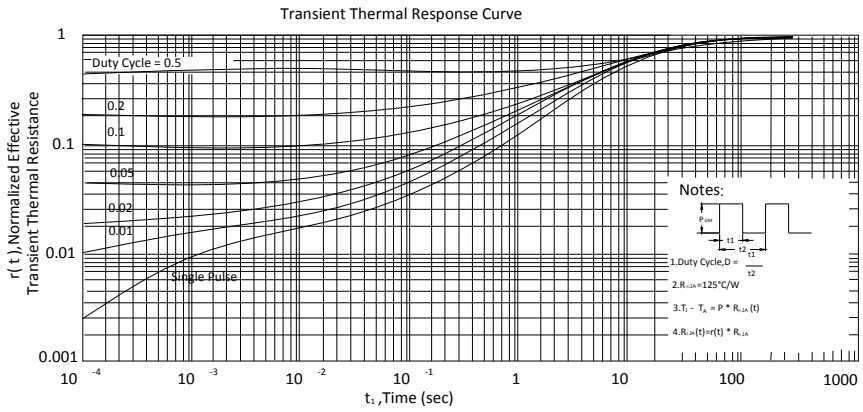

Body Diode Forward Voltage Variation
with Source Current and Temperature
VGS= 0V
TJ= 125°C
25°C
-55°C
IS, Reverse Drain Current (A)
VSD, Body Diode Forward Voltage(V)


Gate-Charge Characteristics
I_D = 6A
V_{DS}= 5V
10V
V_{GS}, Gate-Source Voltage(V)
Qg, Gate Charge (nC)

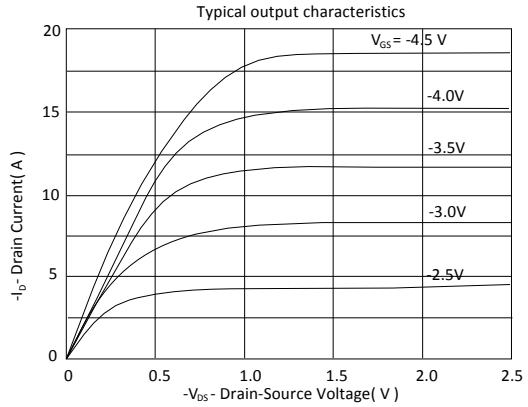

Capacitance Characteristics
f =1MHz
V_{GS}=0 V
Ciss
Coss
Crss
Capacitance(pF)
V_{DS}, Drain-Source Voltage(V)

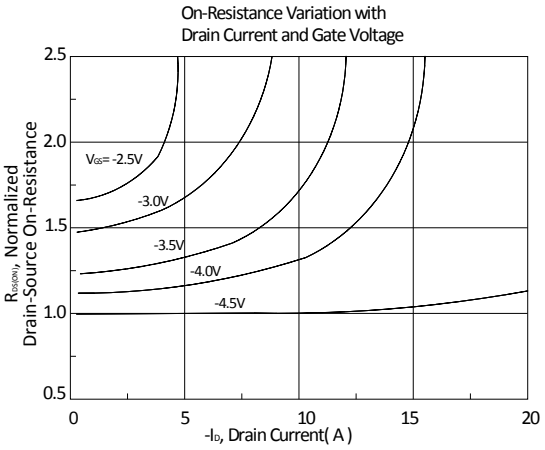

Maximum Safe Operating Area
$R_{DS(ON)}$ LIMIT
100 μs
1ms
10ms
100ms
1s
DC
V_{GS} =4.5V
SINGLE PULSE
$R_{\theta JA}$=125°C/W
TA=25°C
I_D,Drain Current(A)
V_{DS},Drain-Source Voltage(V)

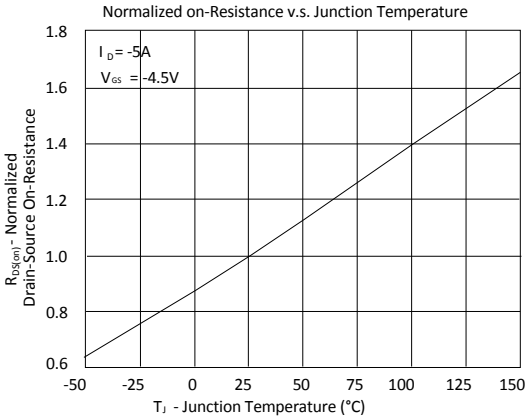

Single Pulse Maximum Power Dissipation
Single Pulse
$R_{\theta JA}$ = 125°C/W
T_A = 25°C
P(pk),Peak Transient Power(W)
t_1 ,Time (sec)

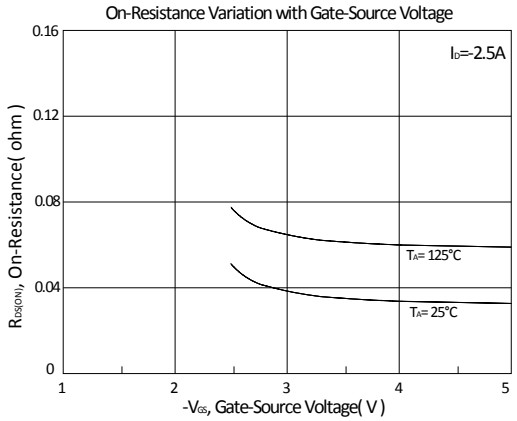

Transient Thermal Response Curve
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
Notes:
1.Duty Cycle,D =
2.$R_{\theta JA}$=125°C/W
3.T_J - T_A = P * $R_{\theta JA}$ (t)
4.$R_{\theta JA}$(t)=r(t) * $R_{\theta JA}$
r(t),Normalized Effective Transient Thermal Resistance
t_1 ,Time (sec)

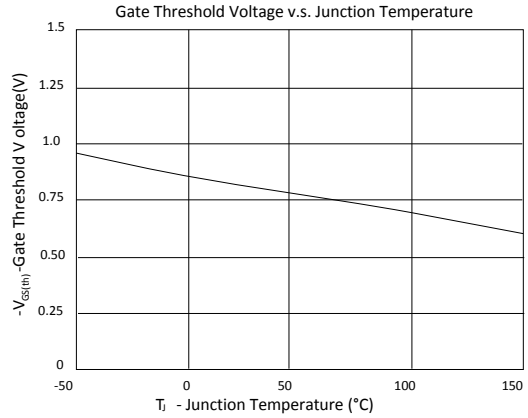
P-Channel

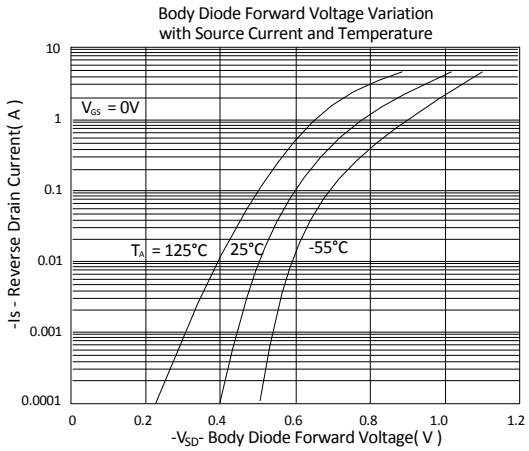

Typical output characteristics
V_{GS}= -4.5 V
-4.0V
-3.5V
-3.0V
-2.5V
$-I_D$- Drain Current(A)
$-V_{DS}$- Drain-Source Voltage(V)


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)

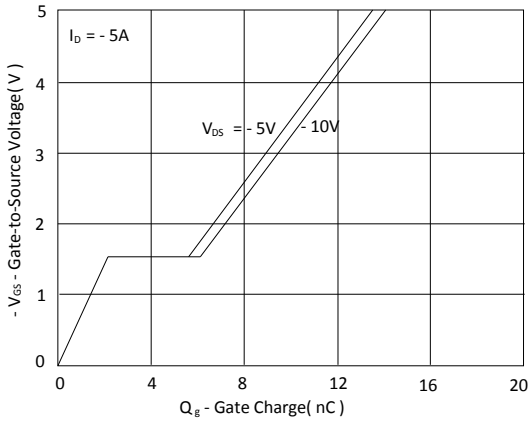

Normalized on-Resistance v.s. Junction Temperature
I_D= -5A
V_{GS} = -4.5V
$R_{DS(on)}$- Normalized
Drain-Source On-Resistance
T_J - Junction Temperature (°C)


On-Resistance Variation with Gate-Source Voltage
I_D=-2.5A
T_A= 125°C
T_A= 25°C
$R_{DS(ON)}$, On-Resistance(ohm)
$-V_{GS}$, Gate-Source Voltage(V)

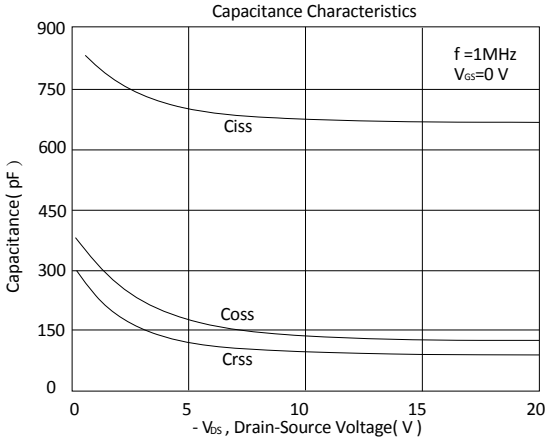

Gate Threshold Voltage v.s. Junction Temperature
$-V_{GS(th)}$-Gate Threshold V oltage(V)
T_J - Junction Temperature (°C)


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)

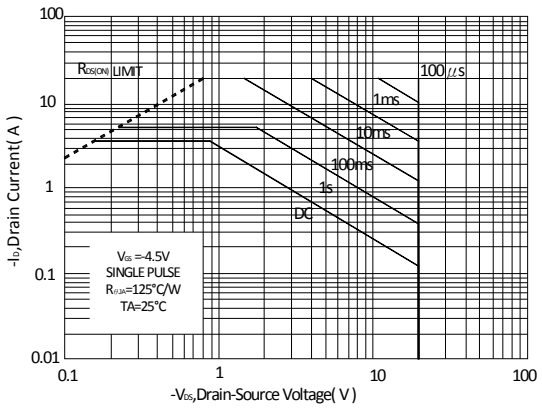
Gate Charge Characteristics



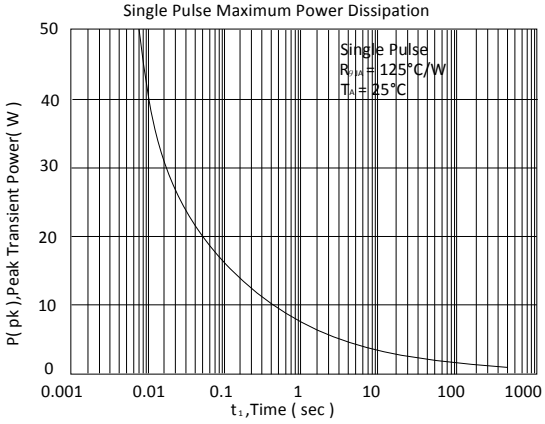
Capacitance Characteristics



Maximum Safe Operating Area



Single Pulse Maximum Power Dissipation



Transient Thermal Response Curve