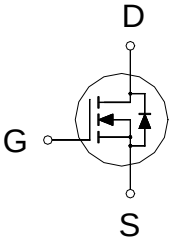
N-Channel Logic Level Enhancement Mode Field Effect Transistor

Product Summary:

BV_{DSS}	20V
$R_{DSON\ (MAX.)}$	30mΩ
I_D	5A



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}	±12	V
Continuous Drain Current	T_A = 25 °C	I_D	5	A
	T_A = 70 °C		3.6	
Pulsed Drain Current[1]		I_{DM}	20	
Power Dissipation	T_A = 25 °C	P_D	1.04	W
	T_A = 70 °C		0.66	
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[3]	$R_{\theta JA}$ (T ≤ 10sec)		83	°C / W
	$R_{\theta JA}$ (Steady State)		120	

[1]Pulse width limited by maximum junction temperature.

[2]Duty cycle ≤ 1%

[3] The device 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	20			V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	0.45	0.75	1.2	
Gate-Body Leakage	I_{GSS}	V_{DS} = 0V, V_{GS} = ±12V			±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 16V, V_{GS} = 0V			1	μA
		V_{DS} = 16V, V_{GS} = 0V, T_J = 125 °C			10	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 5V, V_{GS} = 4.5V	5			A
Drain-Source On-State Resistance[1]	$R_{DS(ON)}$	V_{GS} = 4.5V, I_D = 5A		26	30	mΩ
		V_{GS} = 2.5V, I_D = 4A		45	51	
		V_{GS} = 1.8V, I_D = 2A		56	80	
Forward Transconductance[1]	g_{fs}	V_{DS} = 5V, I_D = 5A		7		S
DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 10V, f = 1MHz		280		pF
Output Capacitance	C_{oss}			47		
Reverse Transfer Capacitance	C_{rss}			38		
Total Gate Charge[1,2]	Q_g	V_{DS} = 10V, V_{GS} = 4.5V, I_D = 5A		6.2		nC
Gate-Source Charge[1,2]	Q_{gs}			0.9		
Gate-Drain Charge[1,2]	Q_{gd}			2.1		
Turn-On Delay Time[1,2]	$t_{d(on)}$	V_{DS} = 10V, I_D = 1A, V_{GS} = 4.5V, R_{GS} = 6Ω		12		nS
Rise Time[1,2]	t_r			15		
Turn-Off Delay Time[1,2]	$t_{d(off)}$			30		
Fall Time[1,2]	t_f			13		
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25 °C)						
Continuous Current	I_S				3	A
Pulsed Current[3]	I_{SM}				12	
Forward Voltage[1]	V_{SD}	I_F = I_S, V_{GS} = 0V			1.2	V

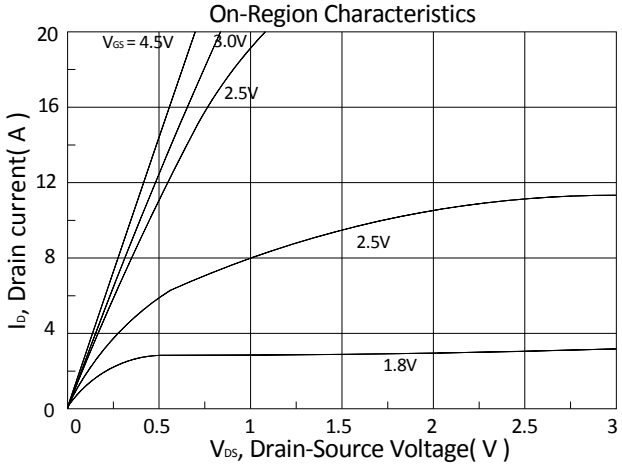
[1]Pulse test : Pulse Width ≤ 300 μsec, Duty Cycle ≤ 2%.

[2]Independent of operating temperature.

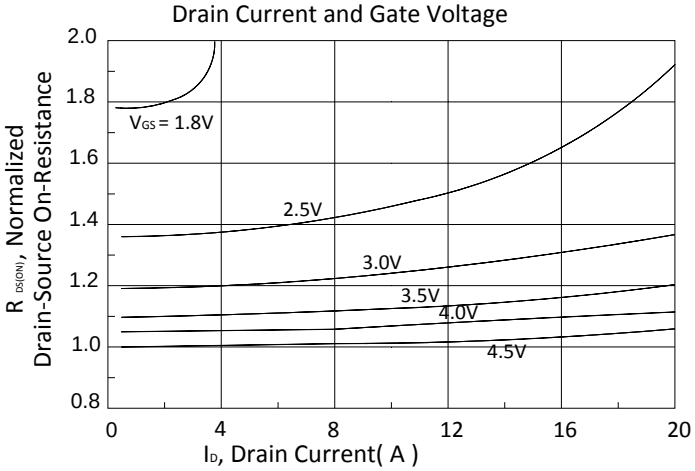
[3]Pulse width limited by maximum junction temperature.

TYPICAL CHARACTERISTICS

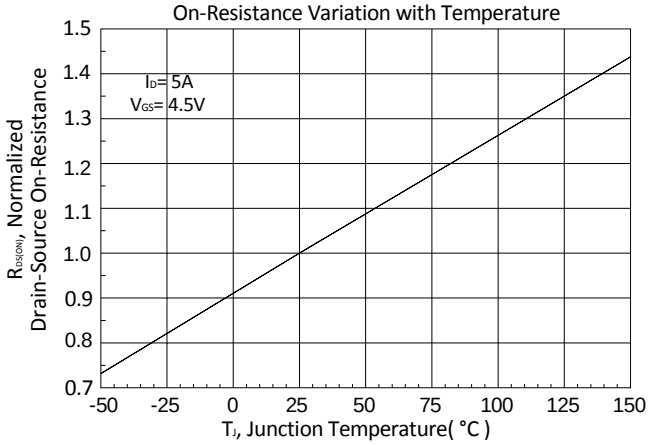
On-Region Characteristics



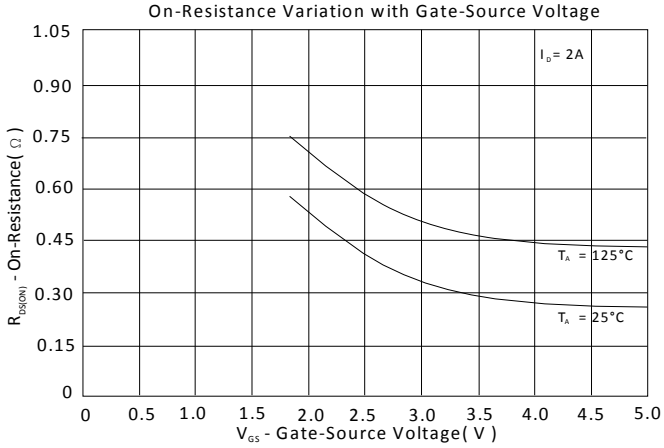
On-Resistance Variation with Drain Current and Gate Voltage



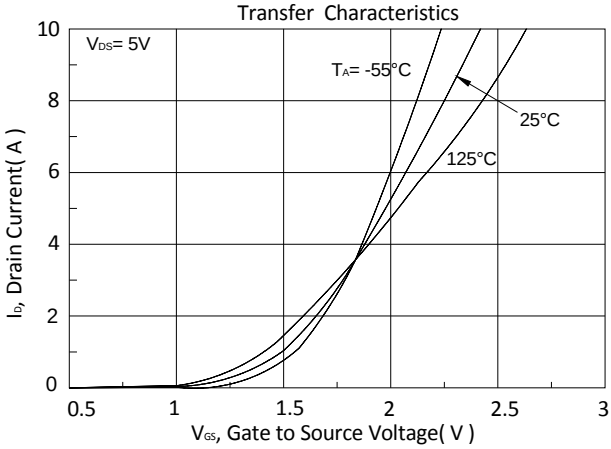
On-Resistance Variation with Temperature



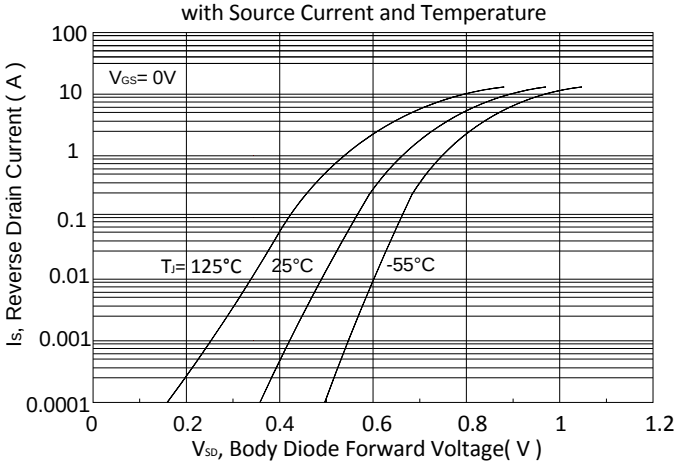
On-Resistance Variation with Gate-Source Voltage

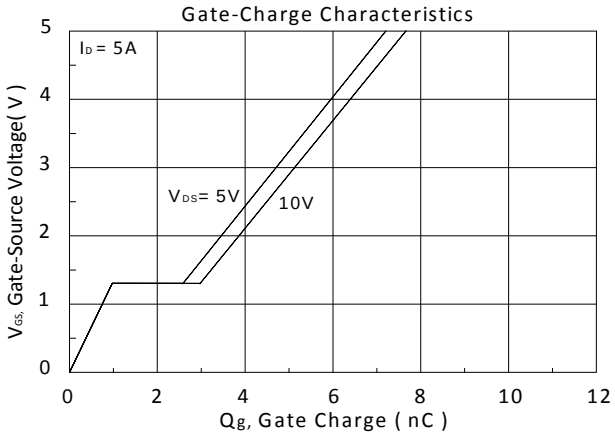


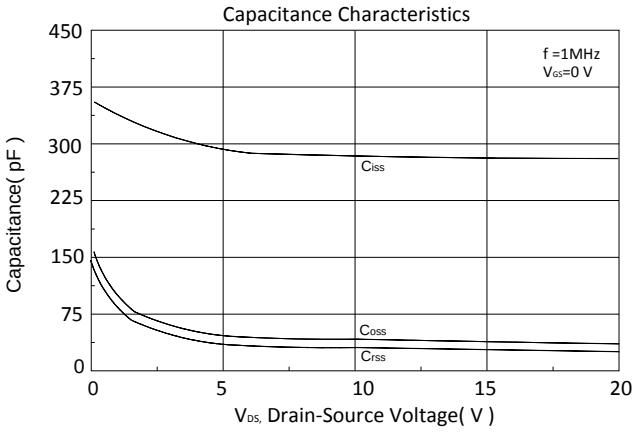
Transfer Characteristics

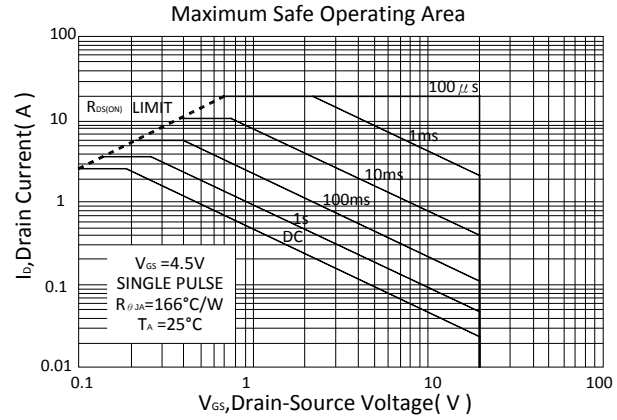


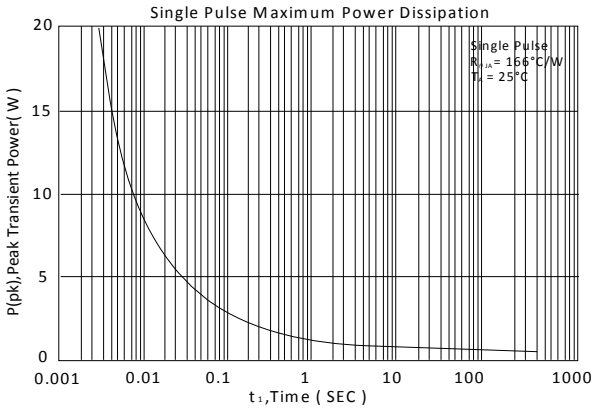
Body Diode Forward Voltage Variation with Source Current and Temperature

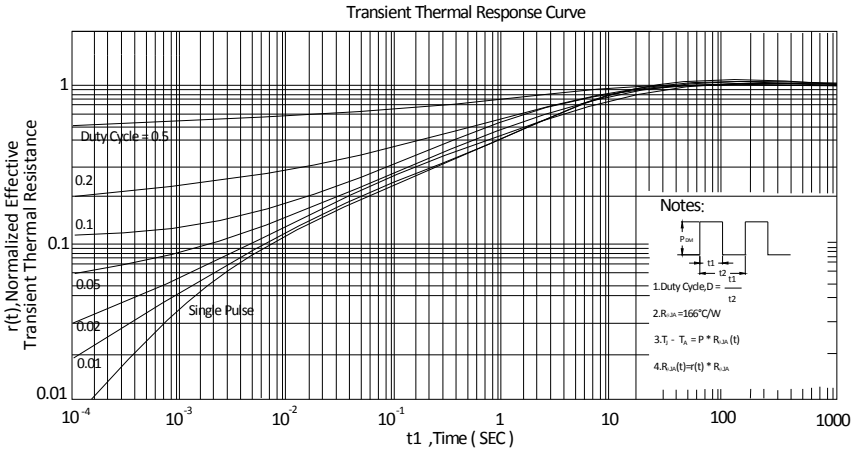



Gate-Charge Characteristics
I_D = 5A
V_DS= 5V
10V
V_GS, Gate-Source Voltage(V)
Qg, Gate Charge (nC)


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

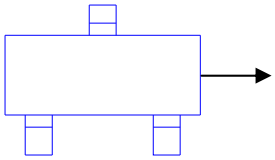

Maximum Safe Operating Area
R_DS(ON) LIMIT
100 μs
1ms
10ms
100ms
1s
DC
V_GS =4.5V
SINGLE PULSE
R_θJA=166°C/W
T_A =25°C
I_D,Drain Current(A)
V_GS,Drain-Source Voltage(V)


Single Pulse Maximum Power Dissipation
Single Pulse
R_θJA = 166°C/W
T_A = 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.R_θJA =166°C/W
3.T_J - T_A = P * R_θJA (t)
4.R_θJA(t)=r(t) * R_θJA
r(t),Normalized Effective Transient Thermal Resistance
t1 ,Time (SEC)

Ordering & Marking Information:

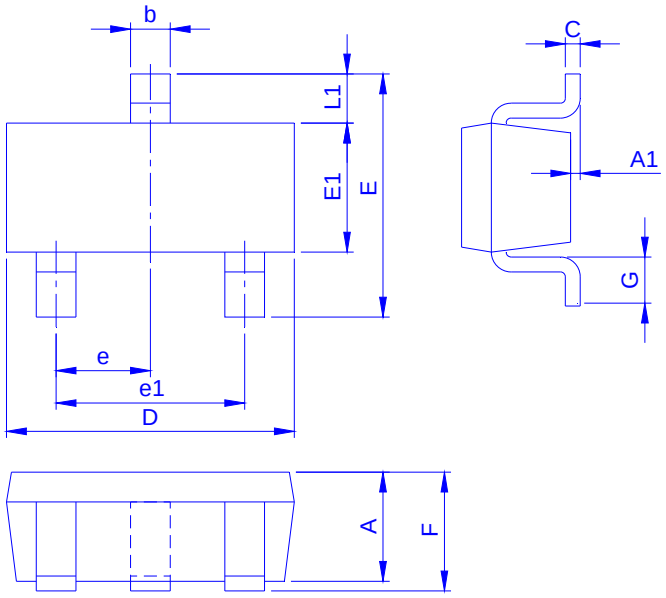
Device Name: LB30N02QS for SOT-23



11: Device Code, 11 for LB30N02QS

ABC: Date Code

Outline Drawing



Dimension in mm

Dimension	A	A1	b	C	D	E	E1	e	e1	F	G	L1
Min.	0.70	0	0.3	0.08	2.80	2.25	1.2	0.90		0.80	0.3	0.50
Typ.					2.90			0.95	1.9			
Max.	1.15	0.1	0.5	0.20	3.02	3.00	1.7	1.00		1.25	0.6	0.75

Footprint