THE DATASHEET OF

MIC4690YM

OptiMOS â Buck converter series

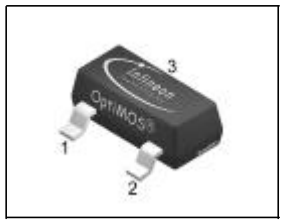
Feature

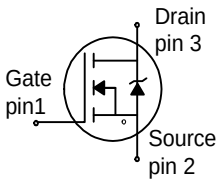
- N-Channel
- Enhancement mode
- Logic Level
- Avalanche rated [1)]
- Pb-free lead plating; RoHS compliant
- Qualified according to AEC Q101
- Halogen-free according to IEC61249-2-21

Product Summary

V_{DS}	55	V
$R_{DS(on)}$	650	mΩ
I_D	0.54	A

PG-SOT 23





Type	Package	Tape and Reel	Marking
BSS670S2L	PG-SOT 23	H6327: 3000 pcs/reel	BSs

Maximum Ratings, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current T_A=25°C T_A=70°C	I_D	 0.54 0.43	A
Pulsed drain current T_A=25°C	$I_{D\ puls}$	2.2	
Avalanche energy, single pulse I_D = 0.54 A, R_G = 25 Ω [1)]	E_{AS}	8.1	mJ
Gate source voltage	V_{GS}	± 20	V
Power dissipation T_A=25°C	P_{tot}	0.36	W
Operating and storage temperature	T_j , T_{stg}	-55... +150	°C
IEC climatic category; DIN IEC 68-1		55/150/56	
ESD Class JESD22-A114-HBM		Class 0	

1) Valid from devices with date code 0604 onwards

Thermal Characteristics

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - soldering point (Pin 3)	R_{thJS}	-	-	290	K/W
SMD version, device on PCB:	R_{thJA}				
@ min. footprint		-	-	350	
@ 6 cm^2 cooling area 2)		-	-	300	

Electrical Characteristics, at T_j = 25 °C, unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain-source breakdown voltage V_{GS}=0, I_D=1mA	$V_{(BR)DSS}$	55	-	-	V
Gate threshold voltage, V_{GS} = V_{DS} I_D=2.7µA	$V_{GS(th)}$	1.2	1.6	2	
Zero gate voltage drain current	I_{DSS}				µA
V_{DS}=55V, V_{GS}=0, T_j=25°C		-	0.01	0.1	
V_{DS}=55V, V_{GS}=0, T_j=150°C		-	1	10	
Gate-source leakage current V_{GS}=20V, V_{DS}=0V	I_{GSS}	-	1	100	nA
Drain-source on-state resistance V_{GS}=4.5V, I_D=270mA	$R_{DS(on)}$	-	430	825	mΩ
Drain-source on-state resistance V_{GS}=10V, I_D=270mA	$R_{DS(on)}$	-	346	650	

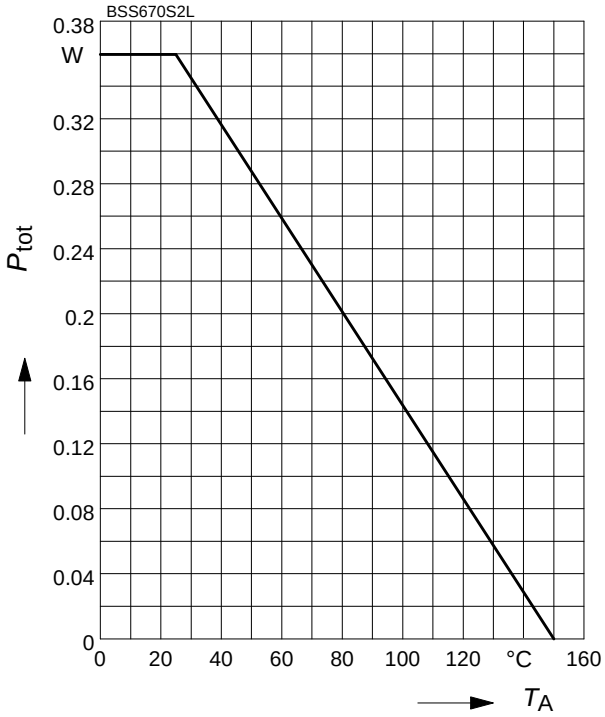
2) Device on 40mm*40mm*1.5mm epoxy PCB FR4 with 6cm² (one layer, 70 µm thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Dynamic Characteristics						
Transconductance	g_{fs}	$V_{DS}\geq 2*I_D*R_{DS(on)max}$, I_D=0.54A	0.6	1.2	-	S
Input capacitance	C_{iss}	V_{GS}=0, V_{DS}=25V, f=1MHz	-	56	75	pF
Output capacitance	C_{oss}		-	13	18	
Reverse transfer capacitance	C_{rss}		-	7	10	
Turn-on delay time	$t_{d(on)}$	V_{DD}=30V, V_{GS}=4.5V, I_D=0.54A, R_G=130Ω	-	9	14	ns
Rise time	t_r		-	25	37	
Turn-off delay time	$t_{d(off)}$		-	21	31	
Fall time	t_f		-	24	32	
Gate Charge Characteristics						
Gate to source charge	Q_{gs}	V_{DD}=40V, I_D=0.54A	-	0.19	0.25	nC
Gate to drain charge	Q_{gd}		-	0.57	0.86	
Gate charge total	Q_g	V_{DD}=40V, I_D=0.54A, V_{GS}=0 to 10V	-	1.7	2.26	
Gate plateau voltage	$V_{(plateau)}$	V_{DD}=40V, I_D=0.54A	-	3.1	-	V
Reverse Diode						
Inverse diode continuous forward current	I_S	T_A=25°C	-	-	0.38	A
Inv. diode direct current, pulsed	I_{SM}		-	-	2.2	
Inverse diode forward voltage	V_{SD}	V_{GS}=0, I_F=0.54A	-	0.8	1.1	V
Reverse recovery time	t_{rr}	V_R=30V, I_F=I_S, di_F/dt=100A/µs	-	51	64	ns
Reverse recovery charge	Q_{rr}		-	22	28	nC

1 Power dissipation

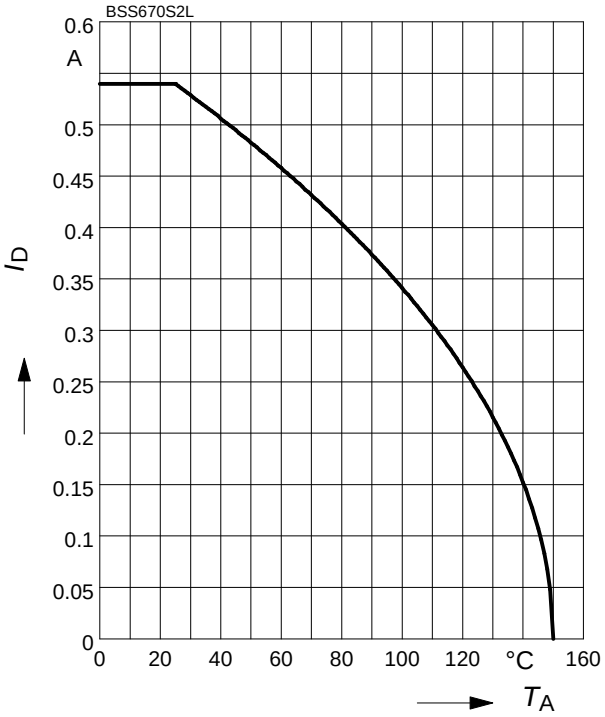
$P_{tot} = f(T_A)$



2 Drain current

$I_D = f(T_A)$

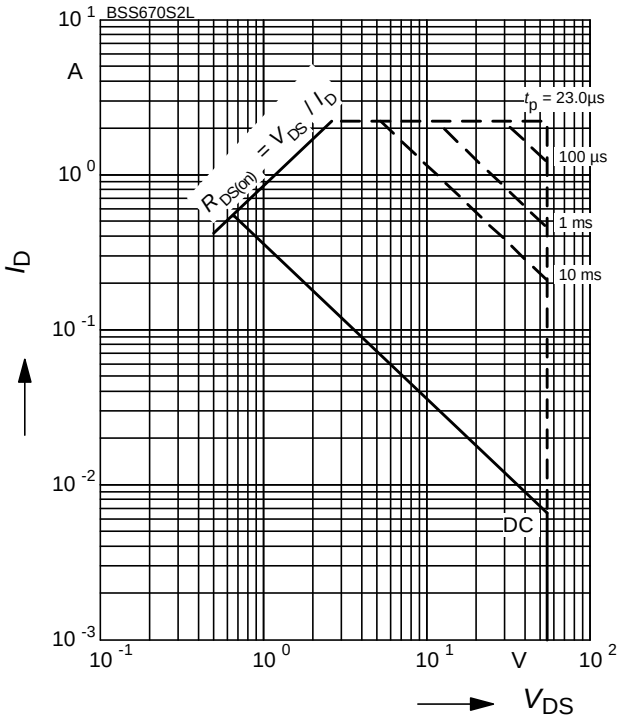
parameter: $V_{GS} \geq 10$ V



3 Safe operating area

$I_D = f(V_{DS})$

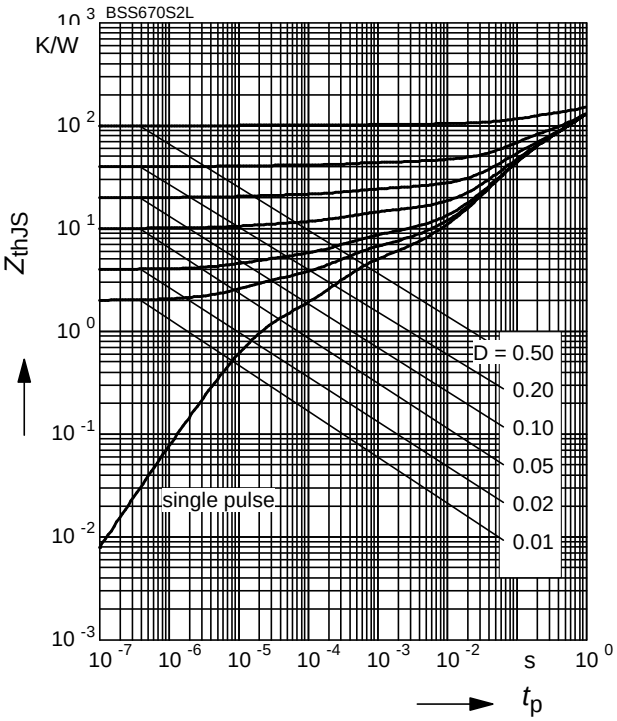
parameter : $D = 0$, $T_A = 25$ °C



4 Transient thermal impedance

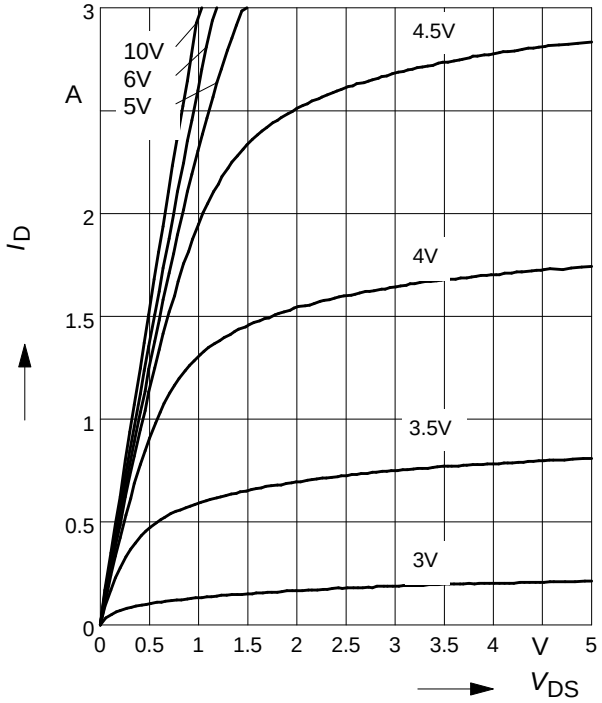
$Z_{thJS} = f(t_p)$

parameter : $D = t_p/T$



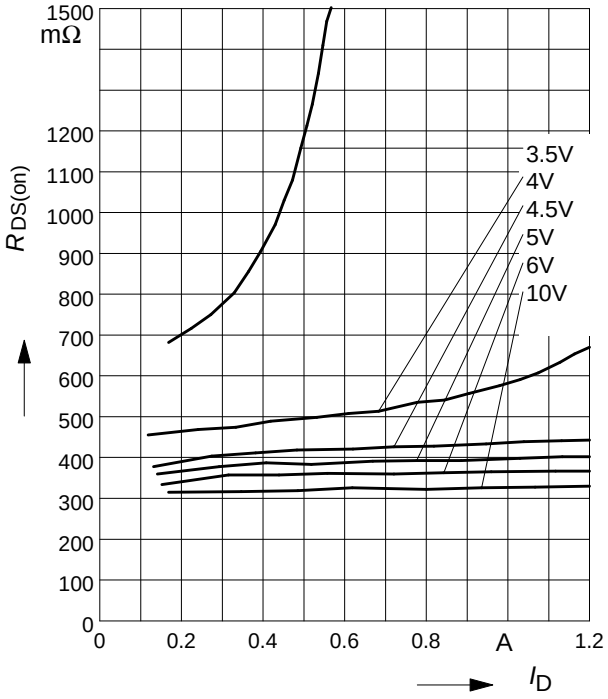
5 Typ. output characteristic

$I_D = f(V_{DS})$; T_j=25°C
parameter: t_p = 80 µs



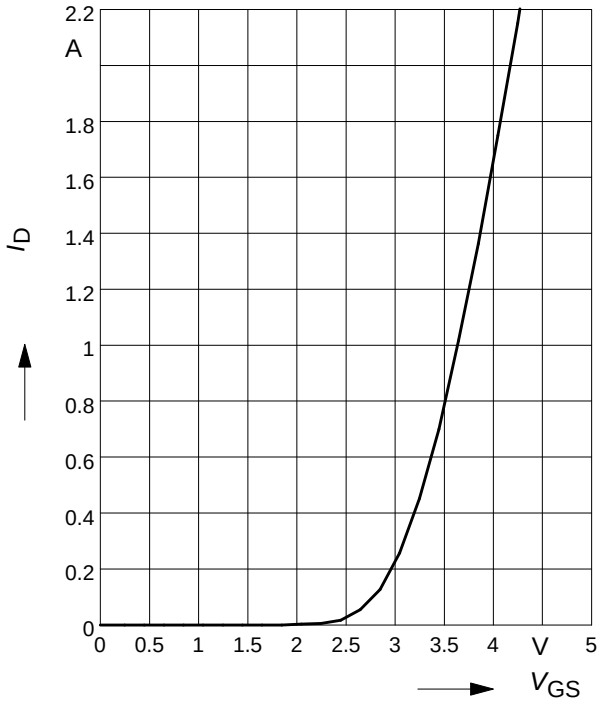
6 Typ. drain-source on resistance

$R_{DS(on)} = f(I_D)$
parameter: V_{GS}



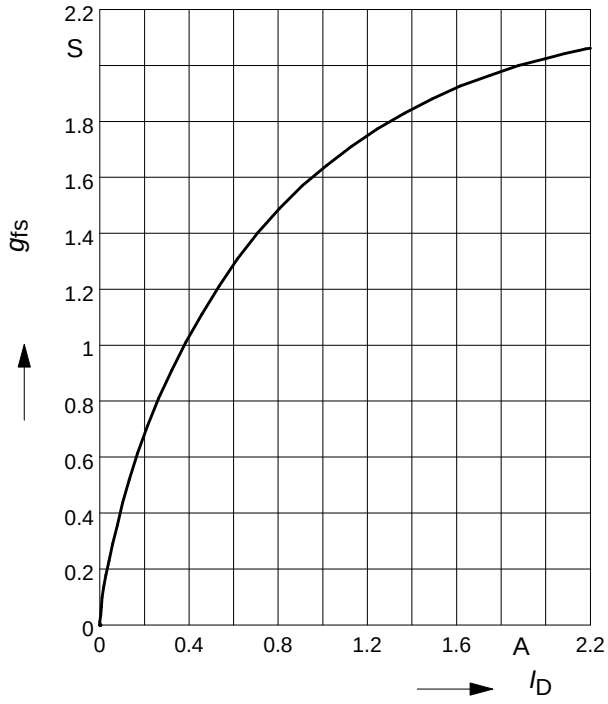
7 Typ. transfer characteristics

$I_D = f(V_{GS})$; $V_{DS} \geq 2 \times I_D \times R_{DS(on)max}$
parameter: t_p = 80 µs



8 Typ. forward transconductance

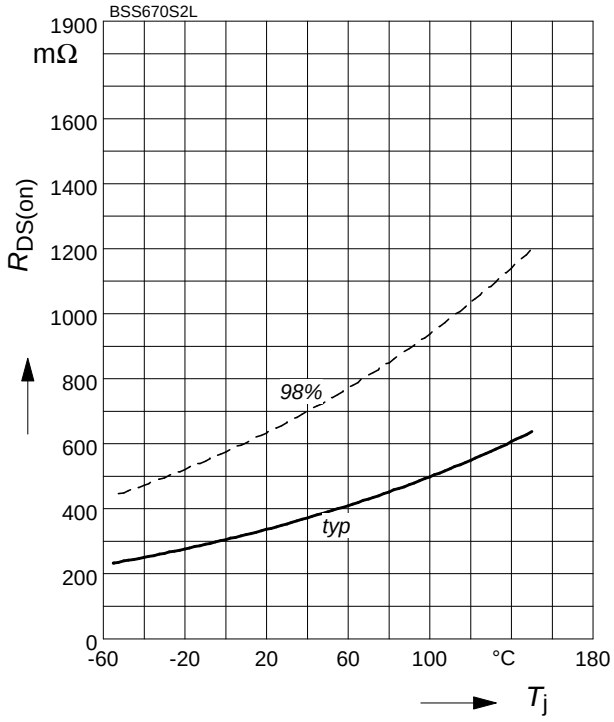
$g_{fs} = f(I_D)$; T_j=25°C
parameter: g_{fs}



9 Drain-source on-state resistance

$R_{DS(on)} = f(T_j)$

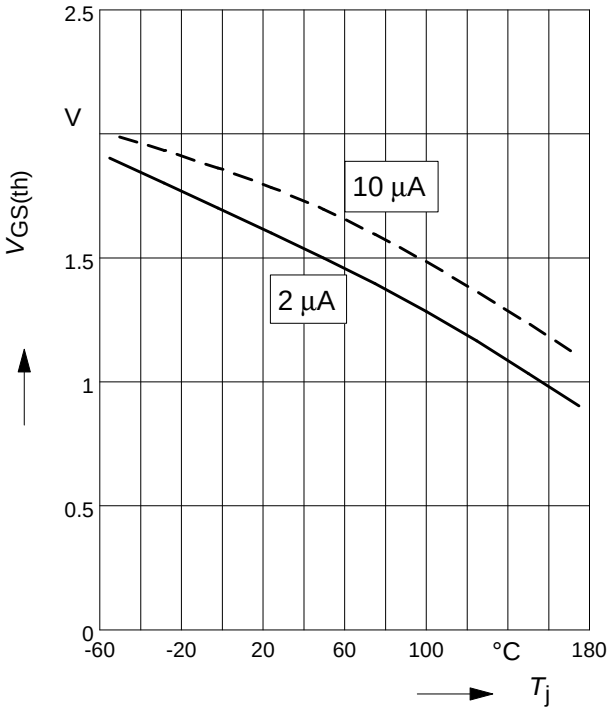
parameter : I_D = 270 mA, V_{GS} = 10 V



10 Typ. gate threshold voltage

$V_{GS(th)} = f(T_j)$

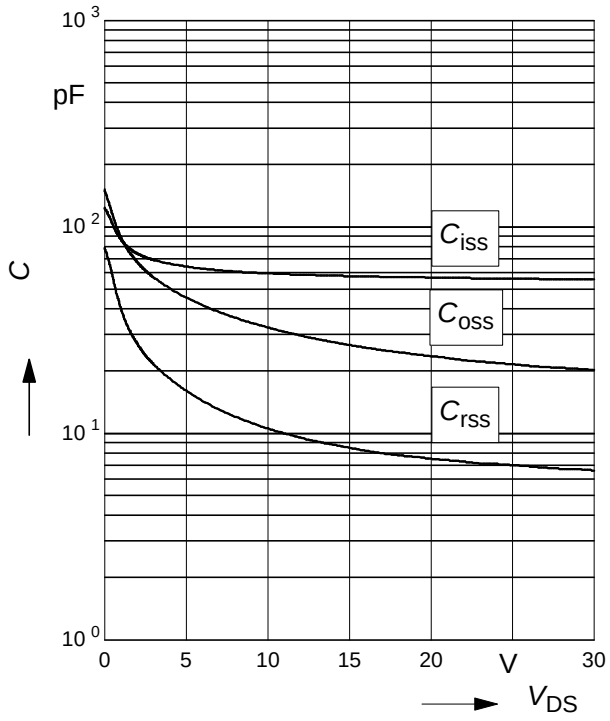
parameter: $V_{GS} = V_{DS}$



11 Typ. capacitances

$C = f(V_{DS})$

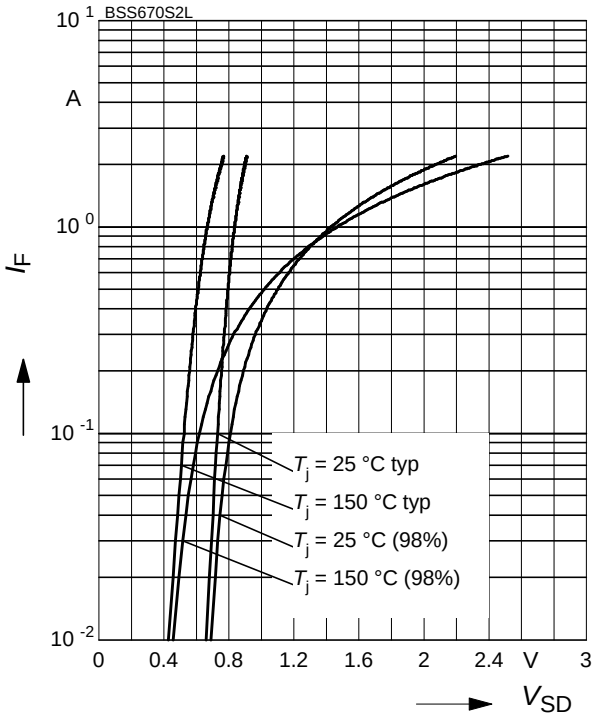
parameter: V_{GS}=0, f=1 MHz



12 Forward character. of reverse diode

$I_F = f(V_{SD})$

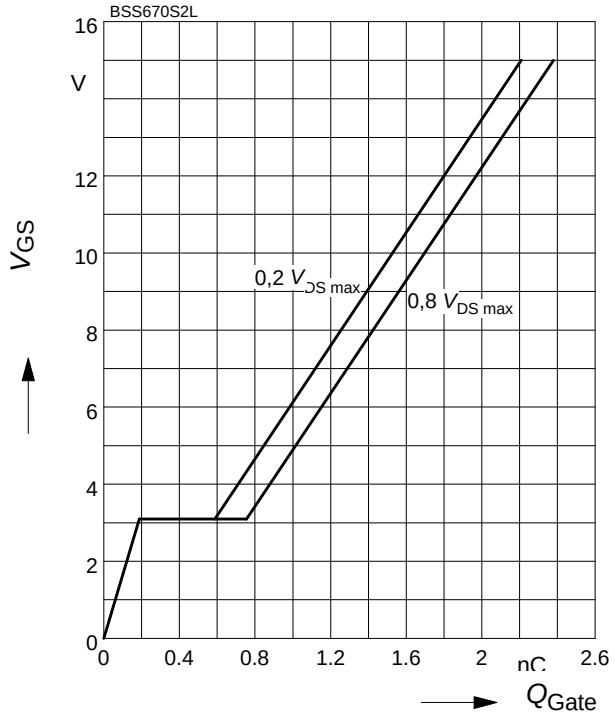
parameter: T_j , tp = 80 µs



13 Typ. gate charge

$V_{GS} = f\ (Q_{Gate})$

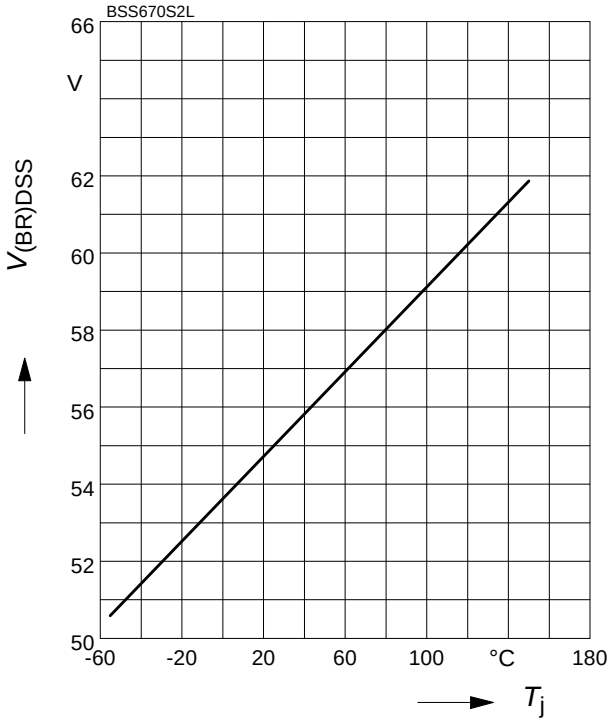
parameter: I_D = 0.54 A pulsed



14 Drain-source breakdown voltage

$V_{(BR)DSS} = f\ (T_j)$

parameter: I_D=10 mA



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