

# 2SJ610

Switching Regulator, DC-DC Converter and  
Motor Drive Applications

Unit: mm

- Low drain-source ON resistance:  $R_{DS(ON)} = 1.85 \Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 18 S$  (typ.)
- Low leakage current:  $I_{DSS} = -100 \mu A$  ( $V_{DS} = -250 V$ )
- Enhancement mode:  $V_{th} = -1.5 \sim -3.5 V$  ( $V_{DS} = 10 V$ ,  $I_D = 1 mA$ )

## Maximum Ratings ( $T_a = 25^\circ C$ )

Characteristics	Symbol	Rating	Unit
Drain-source voltage	$V_{DSS}$	-250	V
Drain-gate voltage ( $R_{GS} = 20 k\Omega$ )	$V_{DGR}$	-250	V
Gate-source voltage	$V_{GSS}$	$\pm 20$	V
Drain current	DC (Note 1)	$I_D$	A
	Pulse ( $t = 1 ms$ ) (Note 1)	$I_{DP}$	
Drain power dissipation	$P_D$	20	W
Single pulse avalanche energy (Note 2)	$E_{AS}$	180	mJ
Avalanche current	$I_{AR}$	-2.0	A
Repetitive avalanche energy (Note 3)	$E_{AR}$	2.0	mJ
Channel temperature	$T_{ch}$	150	$^\circ C$
Storage temperature range	$T_{stg}$	-55~150	$^\circ C$

## Thermal Characteristics

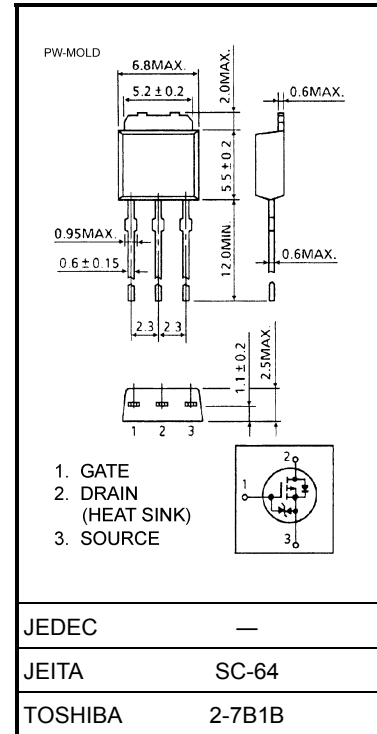
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	6.25	$^\circ C/W$
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	125	$^\circ C/W$

Note 1: Ensure that the channel temperature does not exceed  $150^\circ C$ .

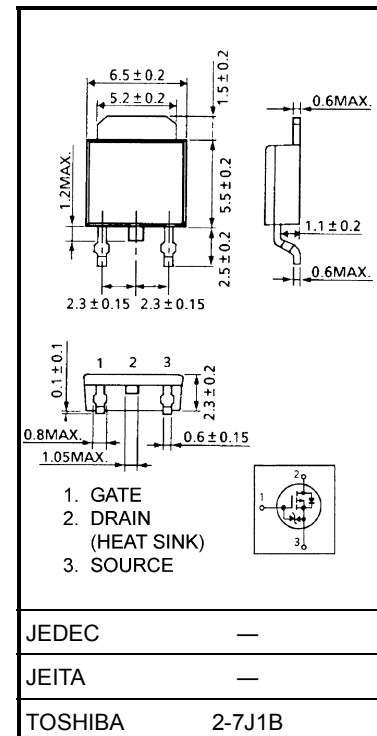
Note 2:  $V_{DD} = -50 V$ ,  $T_{ch} = 25^\circ C$  (initial),  $L = 75 mH$ ,  $I_{AR} = -2.0 A$ ,  $R_G = 25 \Omega$

Note 3: Repetitive rating: pulse width limited by maximum channel temperature

This transistor is an electrostatic-sensitive device. Please handle with caution.

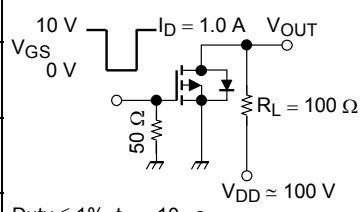


Weight: 0.36 g (typ.)



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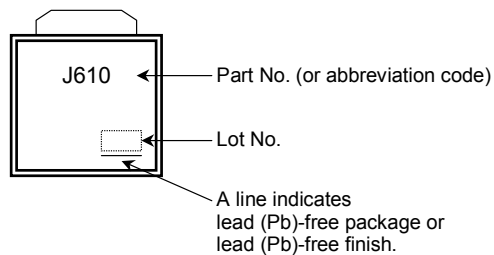
## Electrical Characteristics (Ta = 25°C)

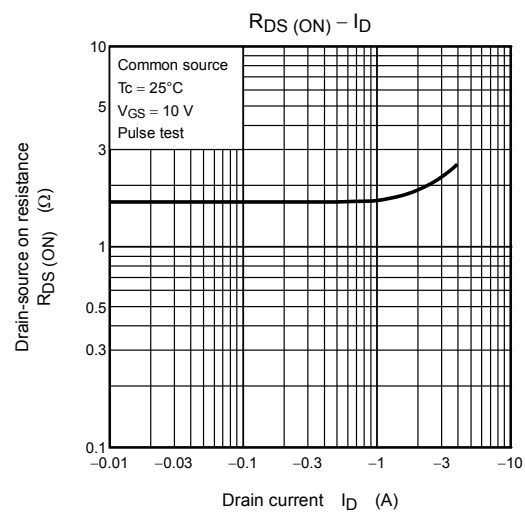
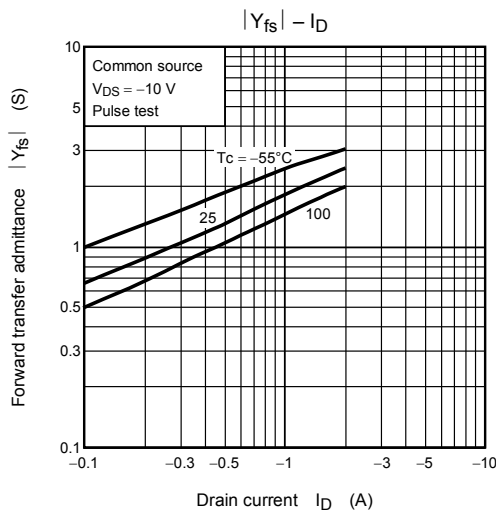
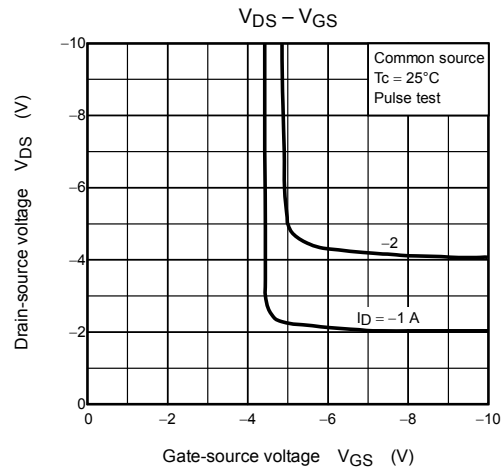
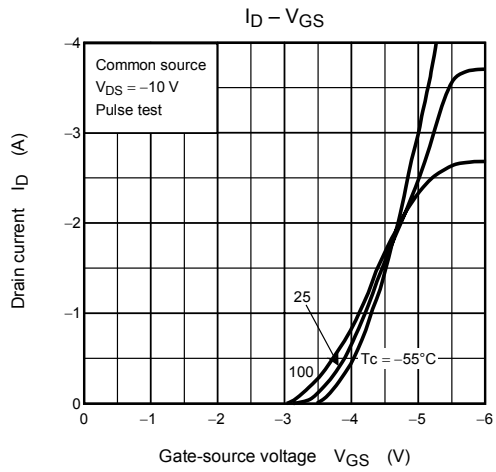
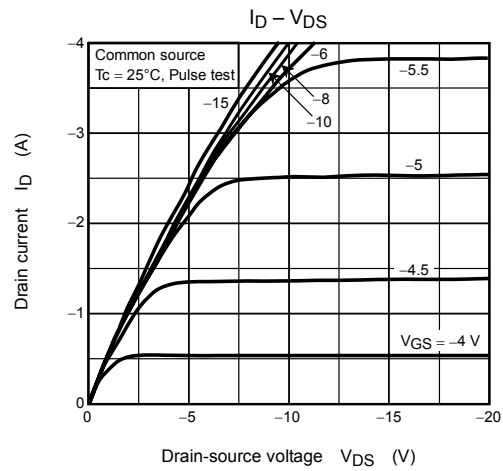
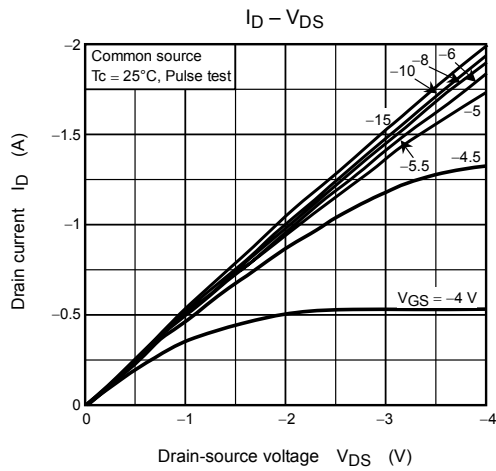
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-off current		$I_{DSS}$	$V_{DS} = -250 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-100	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-250	—	—	V
Gate threshold voltage		$V_{th}$	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$	-1.5	—	-3.5	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -10 \text{ V}, I_D = -1.0 \text{ A}$	—	1.85	2.55	$\Omega$
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -1.0 \text{ A}$	0.5	1.8	—	S
Input capacitance		$C_{iss}$	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	381	—	pF
Reverse transfer capacitance		$C_{rss}$		—	52	—	
Output capacitance		$C_{oss}$		—	157	—	
Switching time	Rise time	$t_r$		—	5	—	ns
	Turn-on time	$t_{on}$		—	20	—	
	Fall time	$t_f$		—	6	—	
	Turn-off time	$t_{off}$		—	36	—	
Total gate charge		$Q_g$	$V_{DD} \approx -200 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -2.0 \text{ A}$	—	24	—	nC
Gate-source charge		$Q_{gs}$		—	11	—	
Gate-drain charge		$Q_{gd}$		—	13	—	

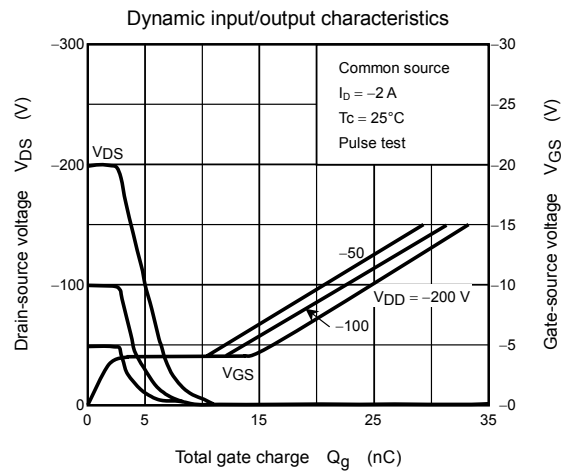
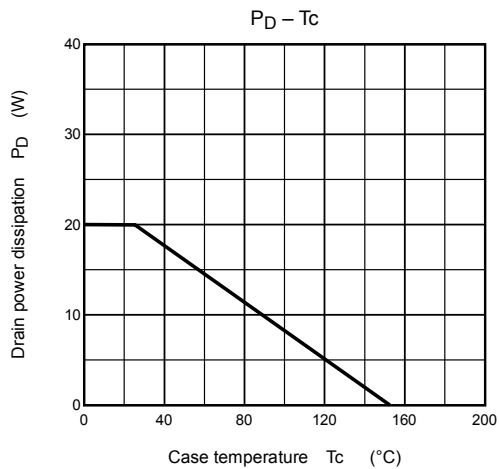
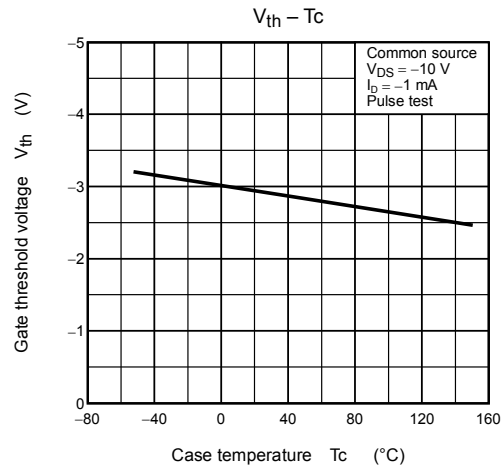
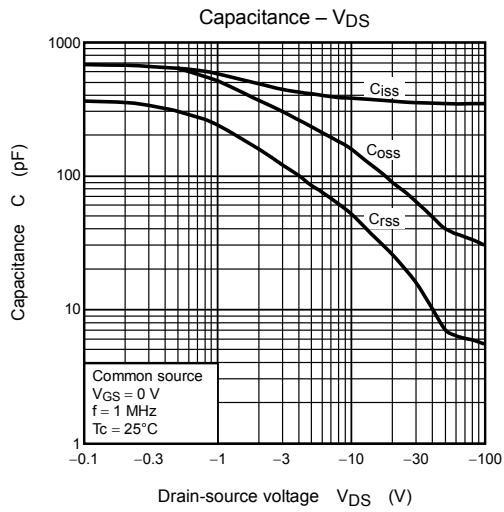
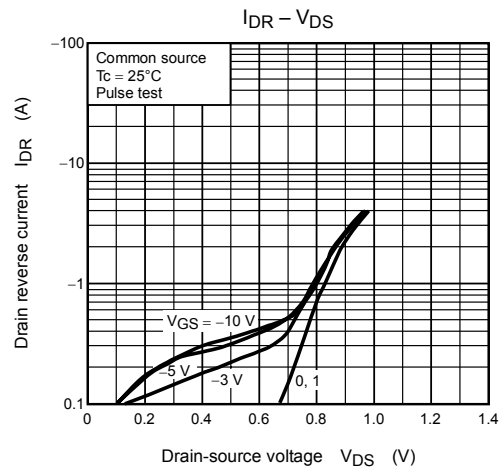
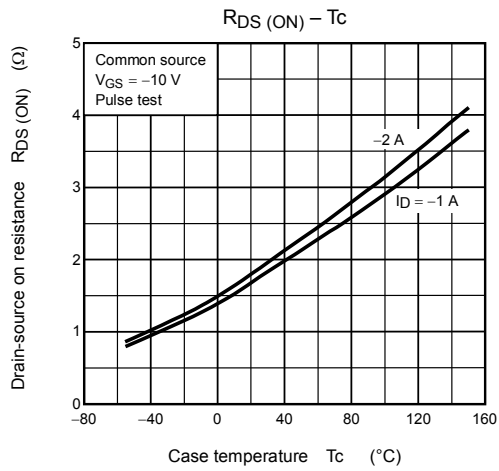
## Source-Drain Ratings and Characteristics (Ta = 25°C)

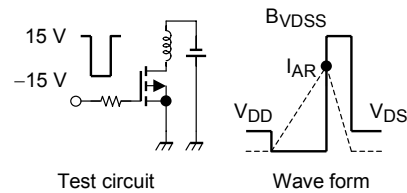
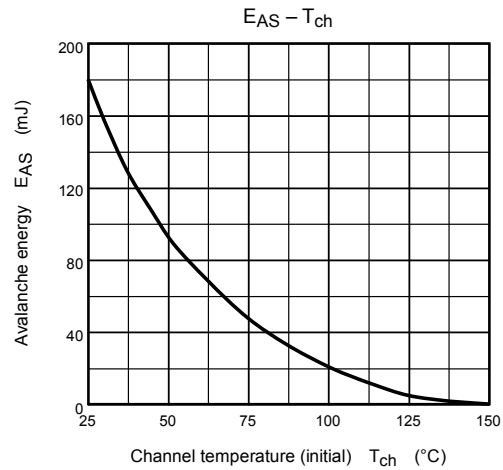
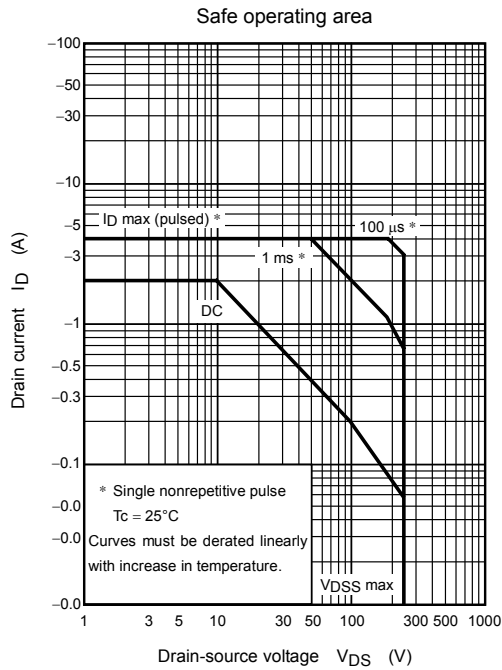
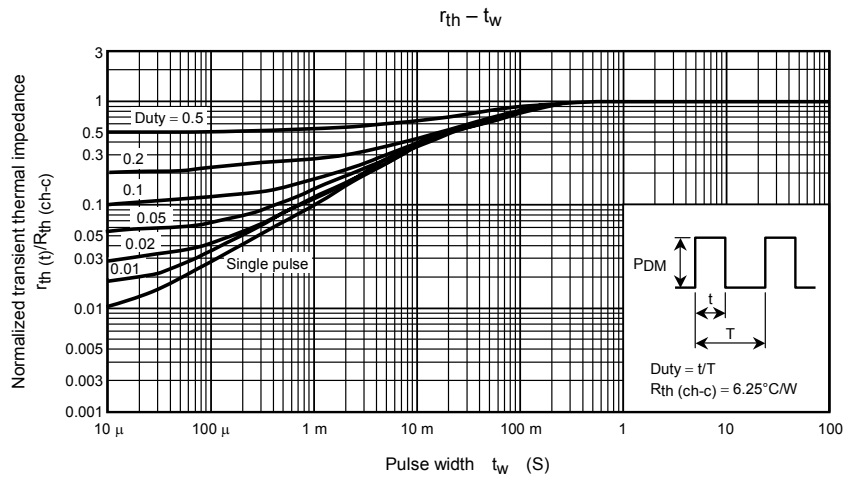
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	$I_{DR}$	—	—	—	-2.0	A
Pulse drain reverse current (Note 1)	$I_{DRP}$	—	—	—	-4.0	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = -2.0 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	2.0	V
Reverse recovery time	$t_{rr}$	$I_{DR} = -2.0 \text{ A}, V_{GS} = 0 \text{ V}, dI_{DR}/dt = 100 \text{ A}/\mu\text{s}$	—	120	—	ns
Reverse recovery charge	$Q_{rr}$		—	540	—	nC

## Marking









$R_G = 25 \Omega$   
 $V_{DD} = -50 V, L = 75 mH$

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