

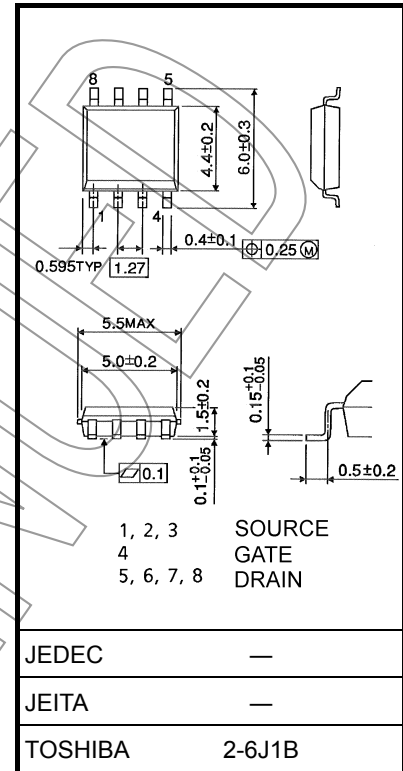
TOSHIBA Field Effect Transistor Silicon P Channel MOS Type (U-MOS IV)

## TPC8113

Lithium Ion Battery Applications  
Notebook PC Applications  
Portable Equipment Applications

Unit: mm

- Small footprint due to small and thin package
- Low drain-source ON resistance:  $R_{DS(ON)} = 8 \text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 23 \text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = -10 \text{ }\mu\text{A}$  (max) ( $V_{DS} = -30 \text{ V}$ )
- Enhancement-mode:  $V_{th} = -0.8$  to  $-2.0 \text{ V}$  ( $V_{DS} = -10 \text{ V}$ ,  $I_D = -1 \text{ mA}$ )



Weight: 0.080 g (typ.)

### Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

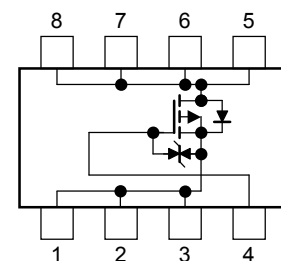
Characteristics		Symbol	Rating	Unit
Drain-source voltage		$V_{DSS}$	-30	V
Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )		$V_{DGR}$	-30	V
Gate-source voltage		$V_{GSS}$	±20	V
Drain current	DC (Note 1)	$I_D$	-11	A
	Pulse (Note 1)	$I_{DP}$	-44	
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2a)		$P_D$	1.9	W
Drain power dissipation ( $t = 10 \text{ s}$ ) (Note 2b)		$P_D$	1.0	W
Single pulse avalanche energy (Note 3)		$E_{AS}$	31.5	mJ
Avalanche current		$I_{AR}$	-11	A
Repetitive avalanche energy (Note 2a) (Note 4)		$E_{AR}$	0.19	mJ
Channel temperature		$T_{ch}$	150	$^\circ\text{C}$
Storage temperature range		$T_{stg}$	-55 to 150	$^\circ\text{C}$

Note: (Note 1), (Note 2), (Note 3) and (Note 4): See the next page.

Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings. Please design the appropriate reliability upon reviewing the Toshiba Semiconductor Reliability Handbook ("Handling Precautions"/Derating Concept and Methods) and individual reliability data (i.e. reliability test report and estimated failure rate, etc.).

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

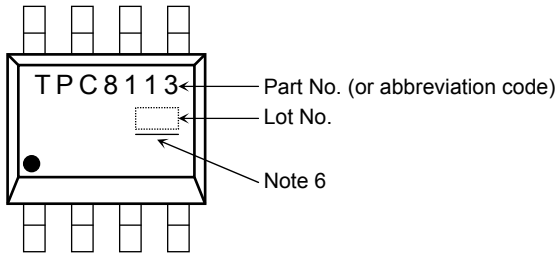
### Circuit Configuration



Thermal Characteristics

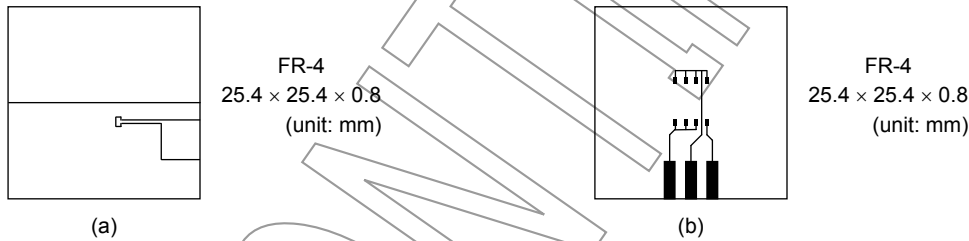
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	$R_{th (ch-a)}$	65.8	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	$R_{th (ch-a)}$	125	°C/W

Marking (Note 5)



Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2: (a) Device mounted on a glass-epoxy board (a) (b) Device mounted on a glass-epoxy board (b)

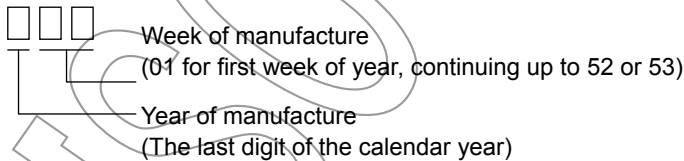


Note 3:  $V_{DD} = -24\text{ V}$ ,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 0.2\text{ mH}$ ,  $R_G = 25\ \Omega$ ,  $I_{AR} = -11\text{ A}$

Note 4: Repetitive rating: pulse width limited by maximum channel temperature

Note 5: • on the lower left of the marking indicates Pin 1.

\* Weekly code: (Three digits)



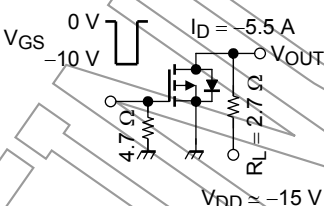
Note 6: A line under a Lot No. identifies the indication of product Labels.

Not underlined:  $[[Pb]]/INCLUDES > MCV$

Underlined:  $[[G]]/RoHS\ COMPATIBLE$  or  $[[G]]/RoHS\ [[Pb]]$

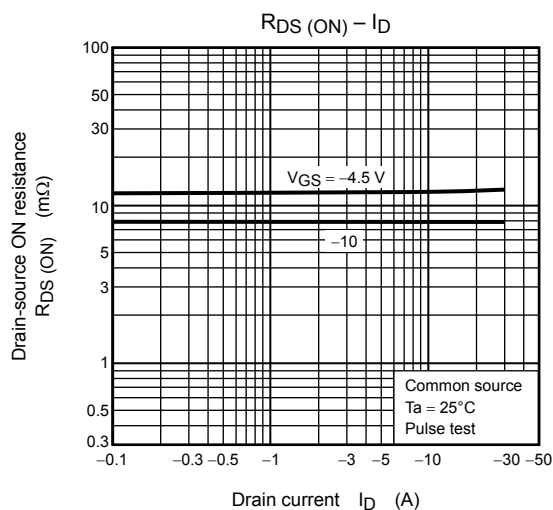
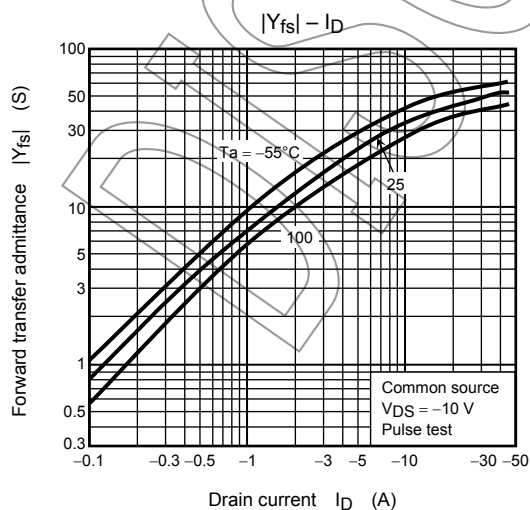
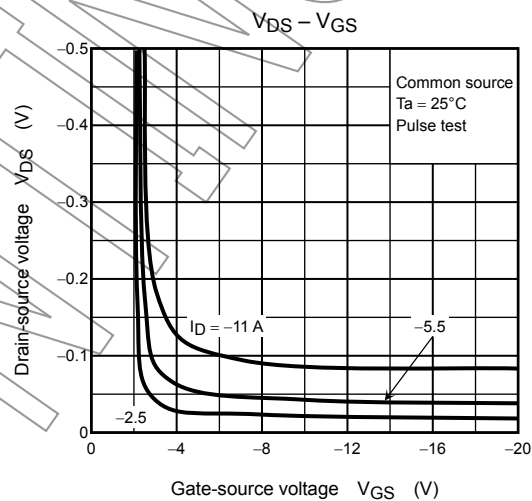
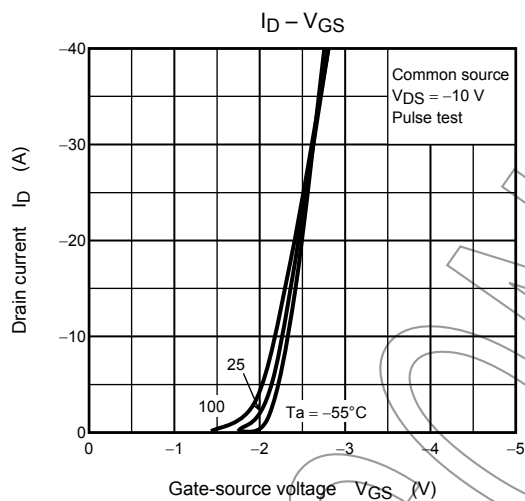
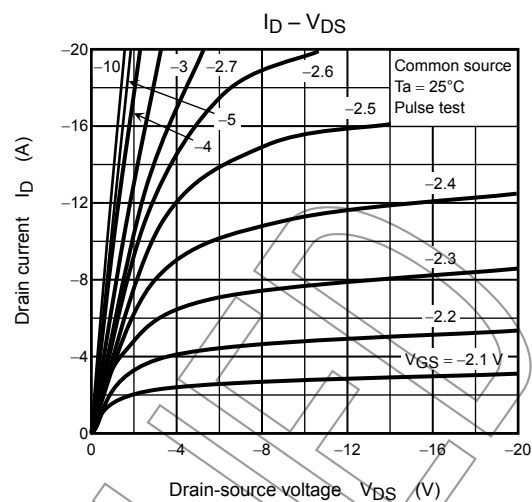
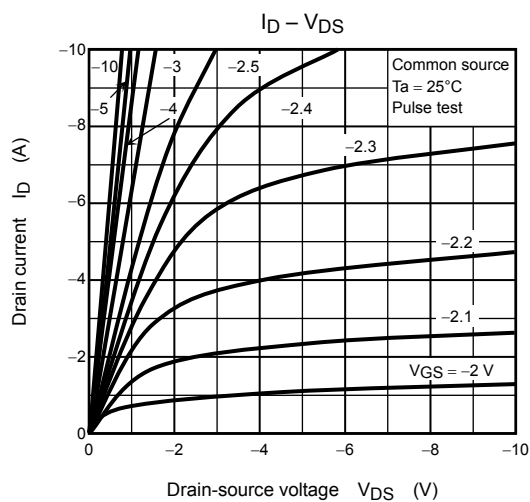
Please contact your TOSHIBA sales representative for details as to environmental matters such as the RoHS compatibility of Product. The RoHS is the Directive 2002/95/EC of the European Parliament and of the Council of 27 January 2003 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

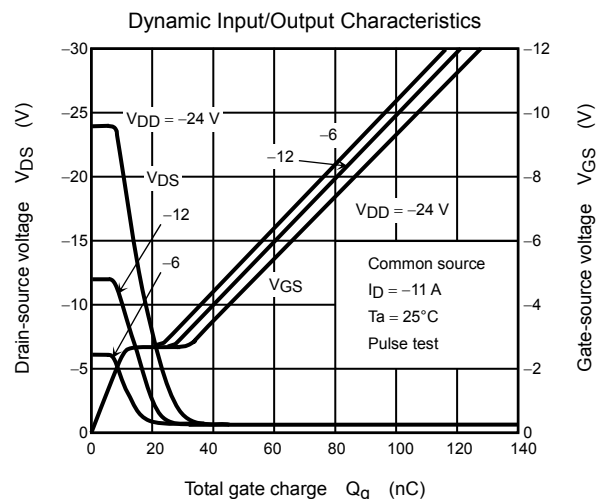
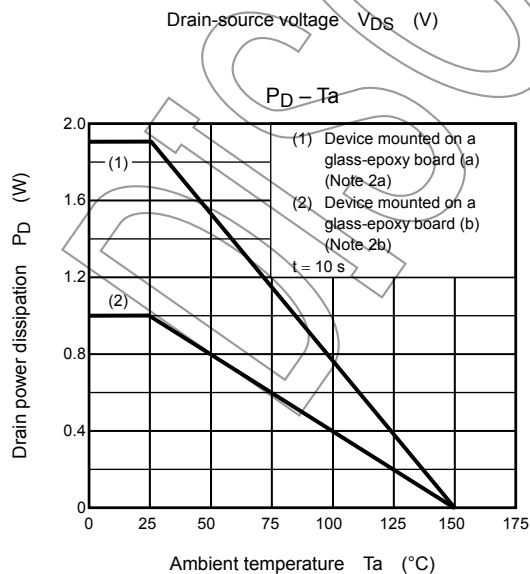
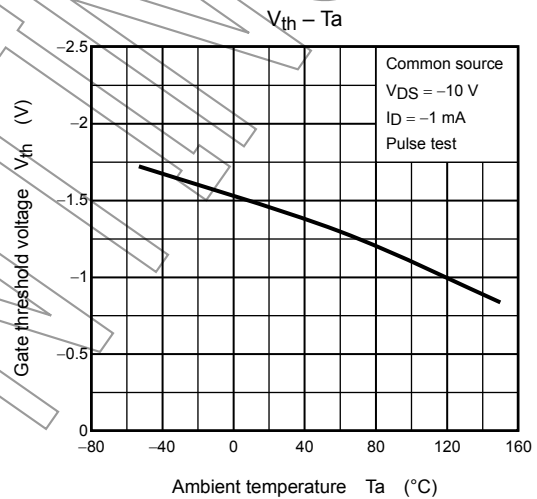
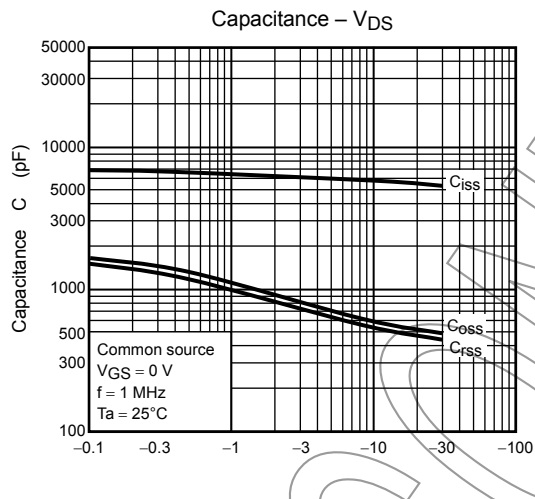
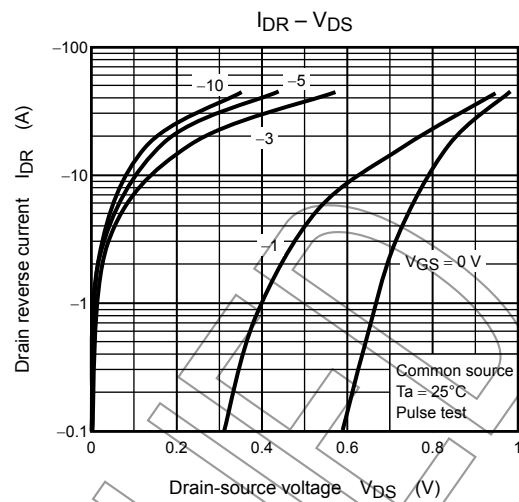
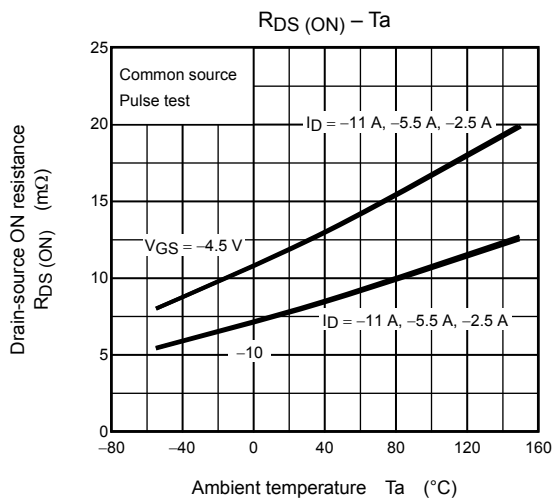
## Electrical Characteristics (Ta = 25°C)

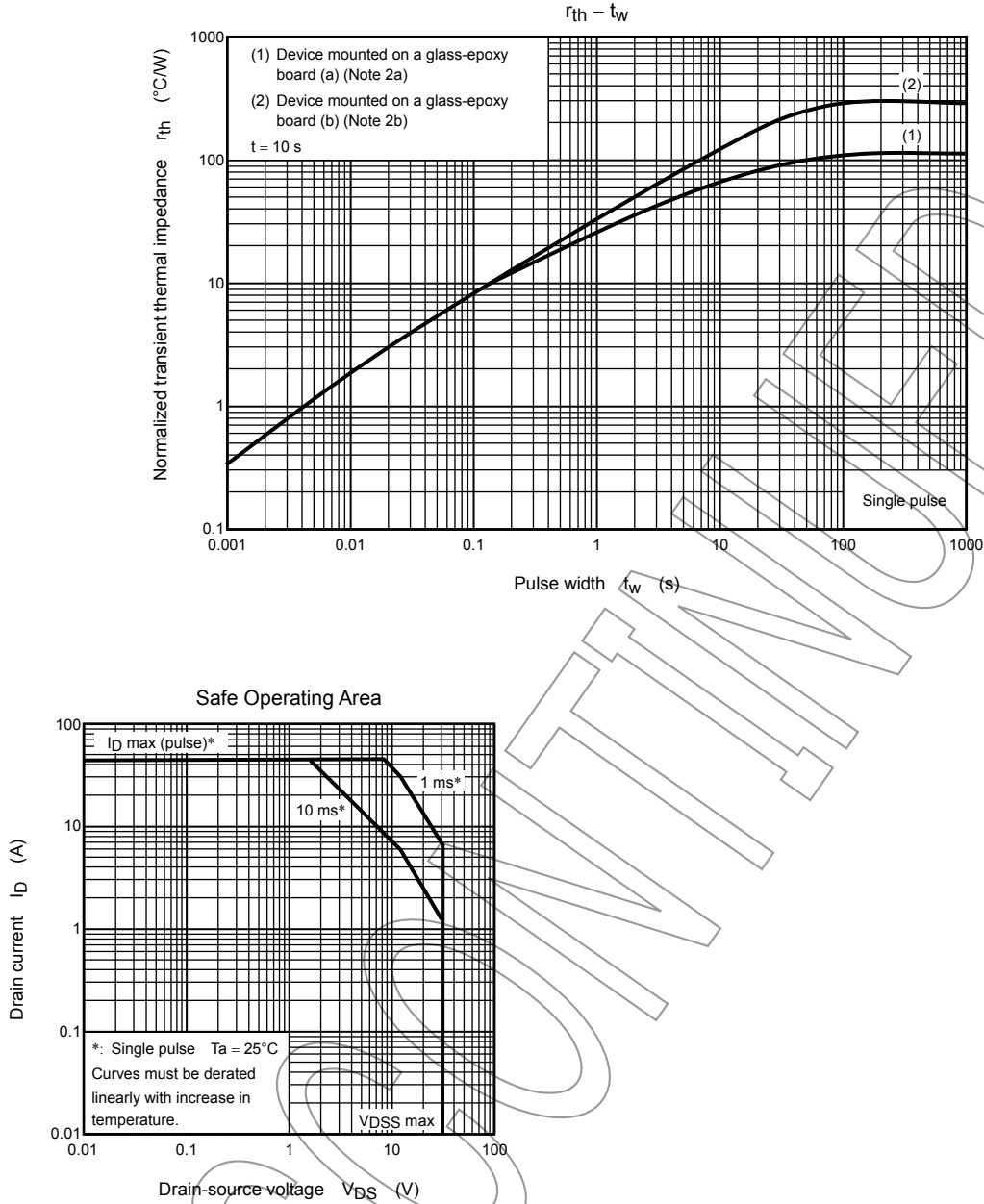
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		$I_{GSS}$	$V_{GS} = \pm 16 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	$\pm 10$	$\mu\text{A}$
Drain cut-OFF current		$I_{DSS}$	$V_{DS} = -30 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-10	$\mu\text{A}$
Drain-source breakdown voltage		$V_{(BR) DSS}$	$I_D = -10 \text{ mA}, V_{GS} = 0 \text{ V}$	-30	—	—	V
		$V_{(BR) DSX}$	$I_D = -10 \text{ mA}, V_{GS} = 20 \text{ V}$	-15	—	—	
Gate threshold voltage		$V_{th}$	$V_{DS} = -10 \text{ V}, I_D = -1 \text{ mA}$	-0.8	—	-2.0	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -4 \text{ V}, I_D = -5.5 \text{ A}$	—	12	18	$\text{m}\Omega$
			$V_{GS} = -10 \text{ V}, I_D = -5.5 \text{ A}$	—	8	10	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10 \text{ V}, I_D = -5.5 \text{ A}$	11	23	—	S
Input capacitance		$C_{iss}$	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	4500	—	pF
Reverse transfer capacitance		$C_{rss}$		—	540	—	
Output capacitance		$C_{oss}$		—	650	—	
Switching time	Rise time	$t_r$	 $V_{GS} = 0 \text{ V}, -10 \text{ V}$ $I_D = -5.5 \text{ A}$ $V_{DD} = -15 \text{ V}$ $R_L = 2.7 \Omega$ $4.7 \Omega$	—	6	—	ns
	Turn-ON time	$t_{on}$		—	13	—	
	Fall time	$t_f$		—	120	—	
	Turn-OFF time	$t_{off}$		Duty $\leq 1\%$ , $t_w = 10 \mu\text{s}$	—	340	
Total gate charge (gate-source plus gate-drain)		$Q_g$	$V_{DD} \approx -24 \text{ V}, V_{GS} = -10 \text{ V}, I_D = -11 \text{ A}$	—	107	—	nC
Gate-source charge 1		$Q_{gs1}$		—	12	—	
Gate-drain ("miller") charge		$Q_{gd}$		—	20	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	$I_{DRP}$	—	—	—	-44	A
Forward voltage (diode)		$V_{DSF}$	$I_{DR} = -11 \text{ A}, V_{GS} = 0 \text{ V}$	—	—	1.2	V







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