

# TPCP8302

Lithium Ion Battery Applications  
Notebook PC Applications  
Portable Equipment Applications

- Small footprint due to small and thin package
- Low drain-source ON-resistance:  $R_{DS(ON)} = 25 \text{ m}\Omega$  (typ.)
- High forward transfer admittance:  $|Y_{fs}| = 14 \text{ S}$  (typ.)
- Low leakage current:  $I_{DSS} = -10 \mu\text{A}$  (max) ( $V_{DS} = -20 \text{ V}$ )
- Enhancement mode:  $V_{th} = -0.4$  to  $-1.0 \text{ V}$  ( $V_{DS} = -6 \text{ V}$ ,  $I_D = -1 \text{ mA}$ )

### Absolute Maximum Ratings (Ta = 25°C)

Characteristic		Symbol	Rating	Unit
Drain-source voltage		V <sub>DSS</sub>	-20	V
Drain-gate voltage ( $R_{GS} = 20 \text{ k}\Omega$ )		V <sub>DGR</sub>	-20	V
Gate-source voltage		V <sub>GSS</sub>	±12	V
Drain current	DC (Note 1)	I <sub>D</sub>	-5	A
	Pulse (Note 1)	I <sub>DP</sub>	-20	
Drain power dissipation ( $t = 5 \text{ s}$ ) (Note 2a)	Single-device operation (Note 3a)	P <sub>D</sub> (1)	1.48	W
	Single-device value at dual operation (Note 3b)	P <sub>D</sub> (2)	1.23	
Drain power dissipation ( $t = 5 \text{ s}$ ) (Note 2b)	Single-device operation (Note 3a)	P <sub>D</sub> (1)	0.58	mJ
	Single-device value at dual operation (Note 3b)	P <sub>D</sub> (2)	0.36	
Single-pulse avalanche energy	(Note 4)	E <sub>AS</sub>	6.5	mJ
Avalanche current		I <sub>AR</sub>	-5	A
Repetitive avalanche energy		E <sub>AR</sub>	0.12	mJ
Single-device value at dual operation (Note 2a, 3b, 5)				
Channel temperature		T <sub>ch</sub>	150	°C
Storage temperature range		T <sub>stg</sub>	-55 to 150	°C

Weight: 0.017 g (typ.)

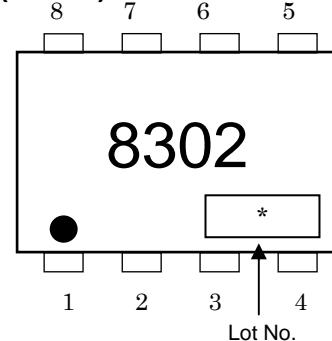
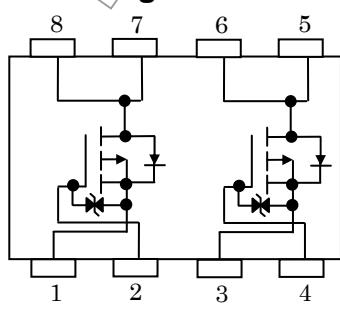
Note: For Notes 1 to 6, see the next page.

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. Handle with care.

## Circuit Configuration

## Marking (Note 6)

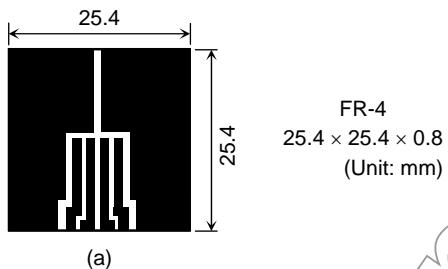


## Thermal Characteristics

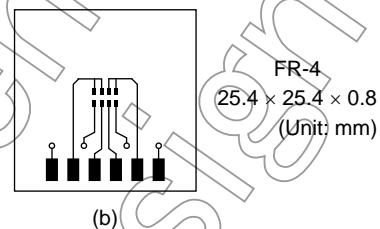
Characteristic	Symbol	Max	Unit
Thermal resistance, channel to ambient ( $t = 5$ s) (Note 2a)	Single-device operation (Note 3a) $R_{th}$ (ch-a) (1)	84.5	°C/W
	Single-device value at dual operation (Note 3b) $R_{th}$ (ch-a) (2)	101.6	
Thermal resistance, channel to ambient ( $t = 5$ s) (Note 2b)	Single-device operation (Note 3a) $R_{th}$ (ch-a) (1)	215.5	°C/W
	Single-device value at dual operation (Note 3b) $R_{th}$ (ch-a) (2)	347.2	

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)



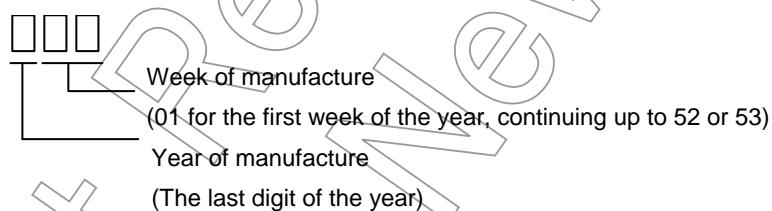
Note 3: a) The power dissipation and thermal resistance values shown are for a single device.  
(During single-device operation, power is applied to one device only.)  
b) The power dissipation and thermal resistance values shown are for a single device.  
(During dual operation, power is applied to both devices evenly.).

Note 4:  $V_{DD} = -16$  V,  $T_{ch} = 25^\circ\text{C}$  (initial),  $L = 0.2$  mH,  $R_G = 25 \Omega$ ,  $I_{AR} = -5$  A

Note 5: Repetitive rating: pulse width limited by maximum channel temperature

Note 6: ● on the lower left of the marking indicates Pin 1.

\* Weekly code (three digits):

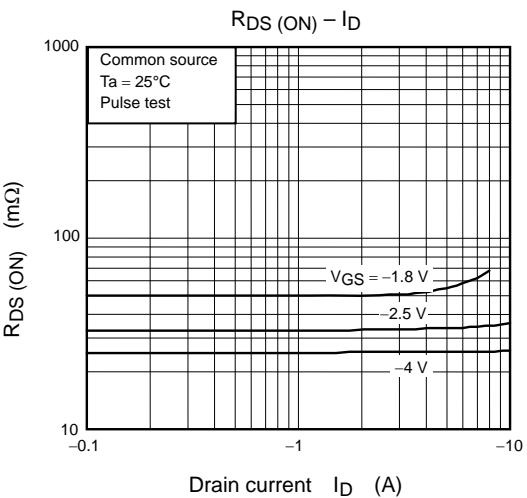
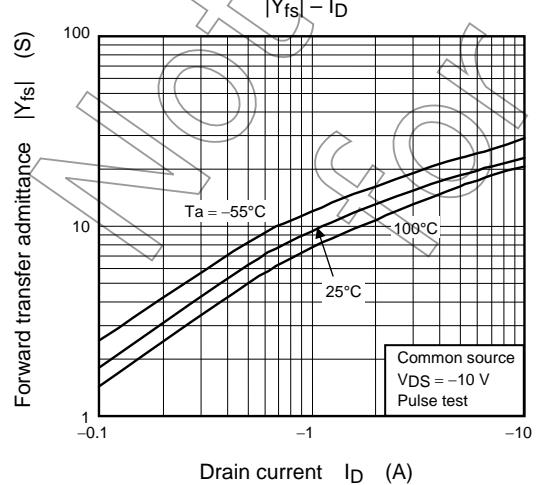
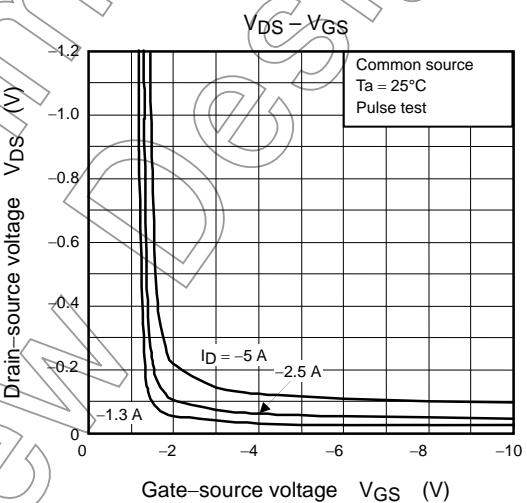
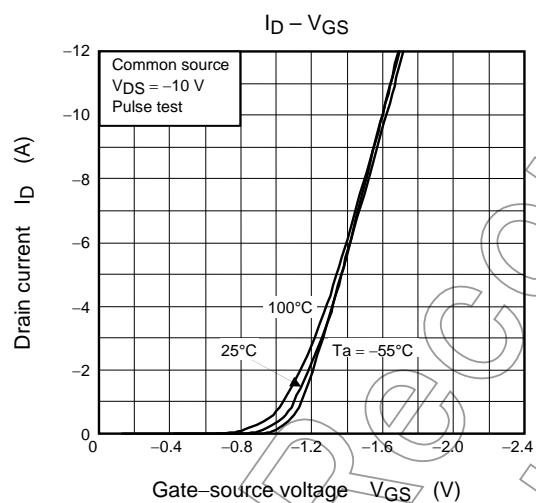
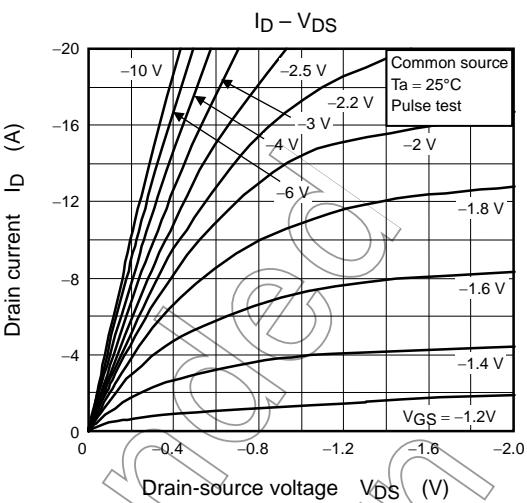
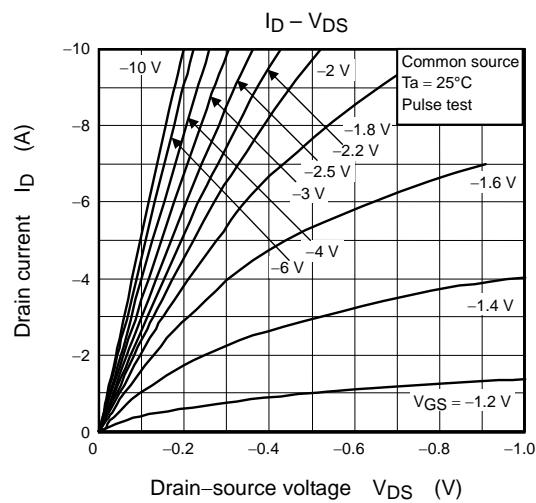


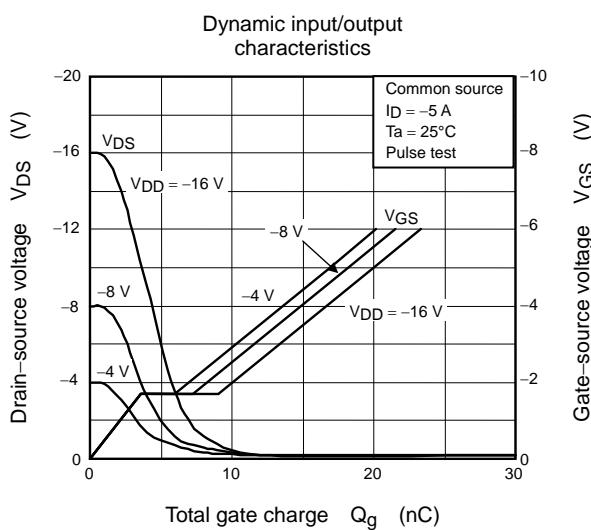
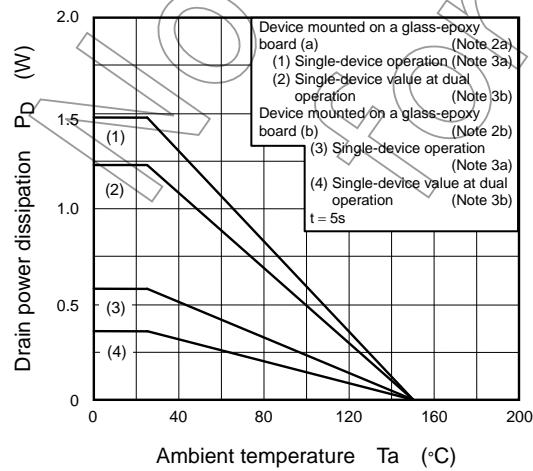
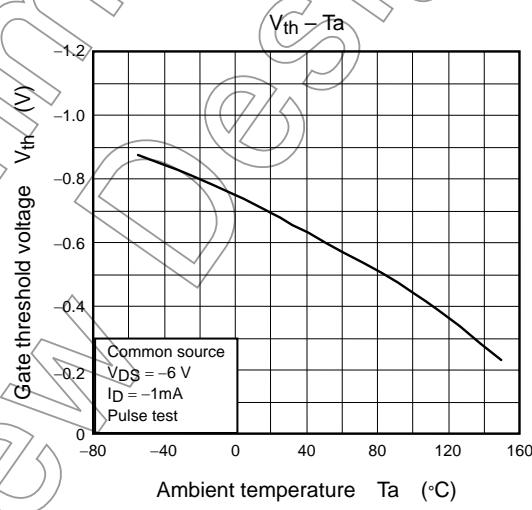
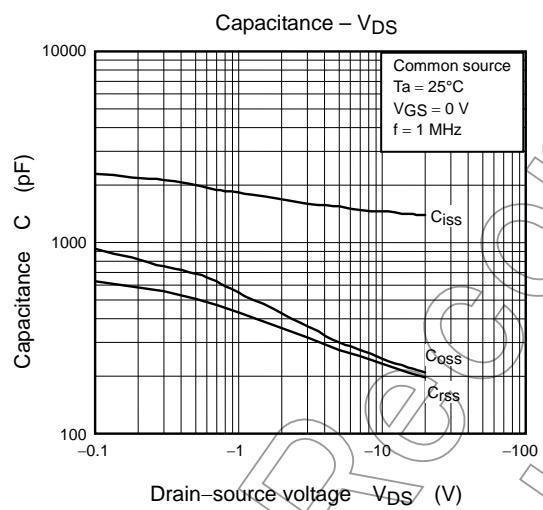
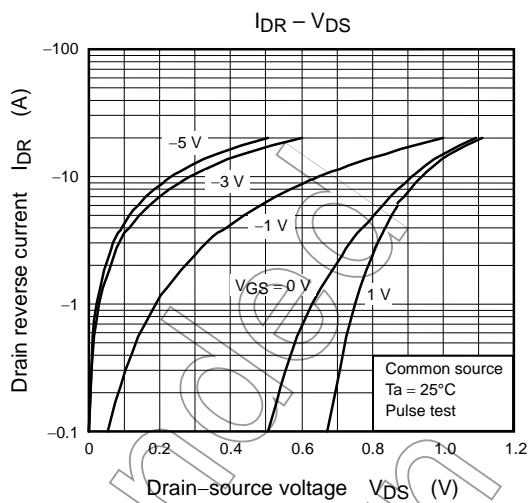
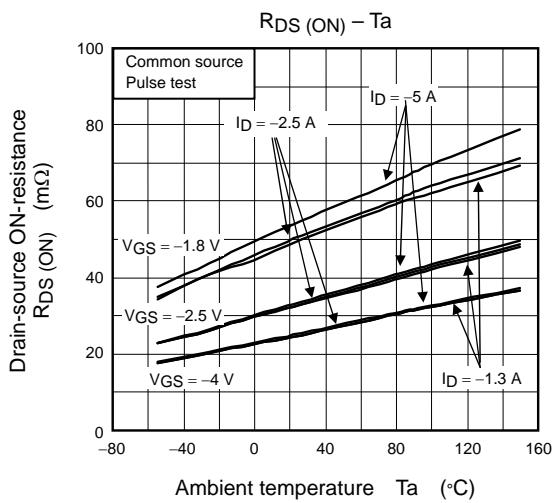
Electrical Characteristics ( $T_a = 25^\circ\text{C}$ )

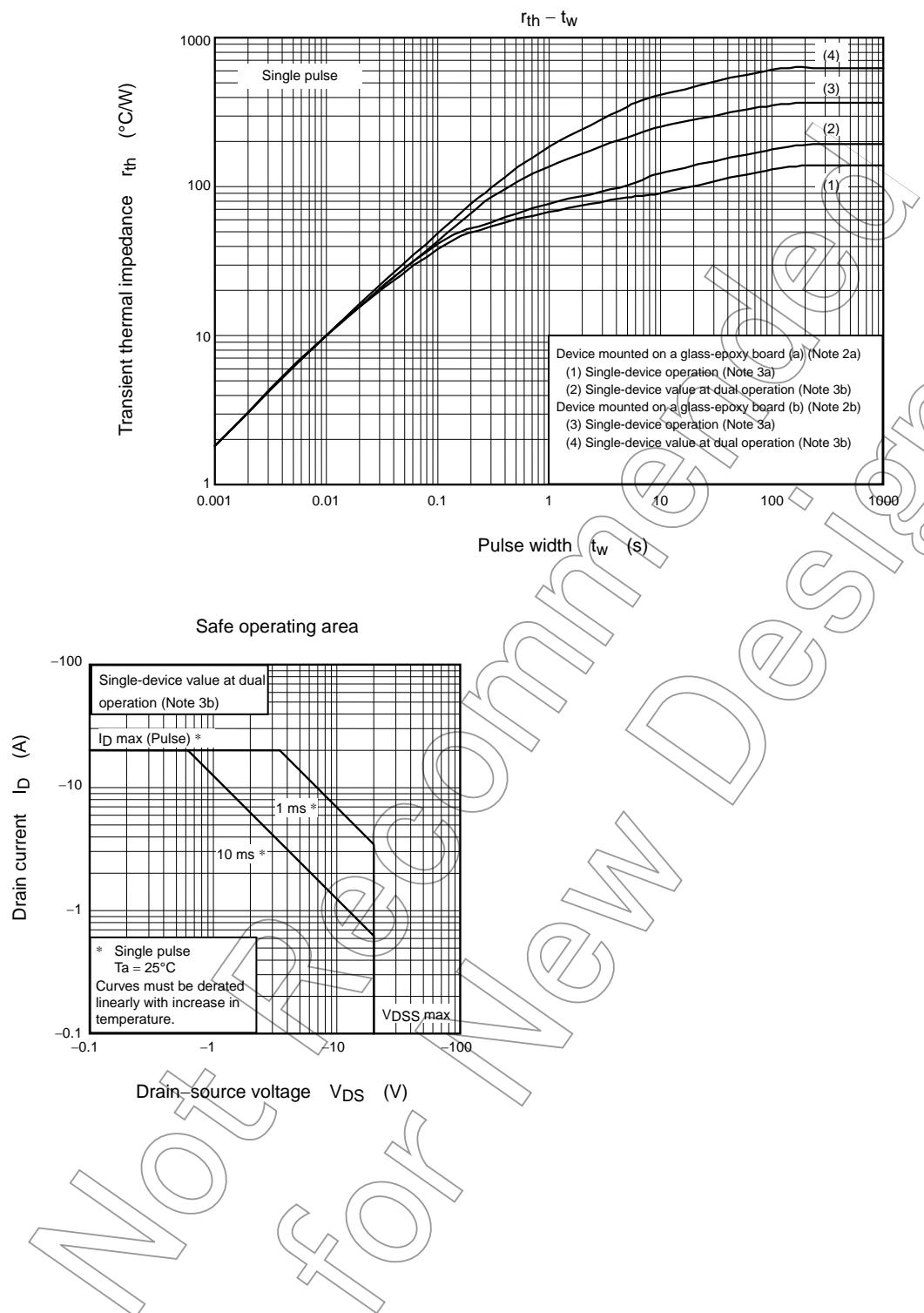
Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit	
Gate leakage current	$I_{GSS}$	$V_{GS} = \pm 10\text{ V}$ , $V_{DS} = 0\text{ V}$	—	—	$\pm 10$	$\mu\text{A}$	
Drain cutoff current	$I_{DSS}$	$V_{DS} = -20\text{ V}$ , $V_{GS} = 0\text{ V}$	—	—	-10	$\mu\text{A}$	
Drain-source breakdown voltage	$V_{(\text{BR})\text{DSS}}$	$I_D = -10\text{ mA}$ , $V_{GS} = 0\text{ V}$	-20	—	—	V	
	$V_{(\text{BR})\text{DSX}}$	$I_D = -10\text{ mA}$ , $V_{GS} = 12\text{ V}$	-8	—	—		
Gate threshold voltage	$V_{th}$	$V_{DS} = -6\text{ V}$ , $I_D = -1\text{ mA}$	-0.4	—	-1.0	V	
Drain-source ON-resistance	$R_{DS\text{ (ON)}}$	$V_{GS} = -1.8\text{ V}$ , $I_D = -0.3\text{ A}$	—	50	95	$\text{m}\Omega$	
	$R_{DS\text{ (ON)}}$	$V_{GS} = -2.5\text{ V}$ , $I_D = -2.5\text{ A}$	—	33	45		
	$R_{DS\text{ (ON)}}$	$V_{GS} = -4\text{ V}$ , $I_D = -2.5\text{ A}$	—	25	33		
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = -10\text{ V}$ , $I_D = -2.5\text{ A}$	7	14	—	S	
Input capacitance	$C_{iss}$	$V_{DS} = -10\text{ V}$ , $V_{GS} = 0\text{ V}$ , $f = 1\text{ MHz}$	—	1500	—	$\text{pF}$	
Reverse transfer capacitance	$C_{rss}$		—	220	—		
Output capacitance	$C_{oss}$		—	240	—		
Switching time	Rise time	$t_r$		—	10	—	ns
	Turn-on time	$t_{on}$		—	20	—	
	Fall time	$t_f$		—	65	—	
	Turn-off time	$t_{off}$		—	200	—	
Total gate charge (gate-source plus gate-drain)	$Q_g$	$V_{DD} \approx -16\text{ V}$ , $V_{GS} = -5\text{ V}$ , $I_D = -5\text{ A}$	—	20	—	$\text{nC}$	
Gate-source charge1	$Q_{gs1}$		—	3.6	—		
Gate-drain ("Miller") charge	$Q_{gd}$		—	5.1	—		

Source-Drain Ratings and Characteristics ( $T_a = 25^\circ\text{C}$ )

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	$I_{DRP}$	Pulse (Note 1)	—	—	-20	A
Forward voltage (diode)	$V_{DSF}$	$I_{DR} = -5\text{ A}$ , $V_{GS} = 0\text{ V}$	—	—	1.2	V







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