

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

TPCS8102

Lithium-Ion Battery Applications
 Portable Equipment Applications
 Notebook PC Applications

- Small footprint due to a small and slim package
- Low drain-source ON resistance: $R_{DS(ON)} = 16 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 17 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = -10 \text{ }\mu\text{A}$ (max.) ($V_{DS} = -20 \text{ V}$)
- Enhancement mode: $V_{th} = -0.5 \sim -1.2 \text{ V}$ ($V_{DS} = -10 \text{ V}$, $I_D = -200 \text{ }\mu\text{A}$)

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

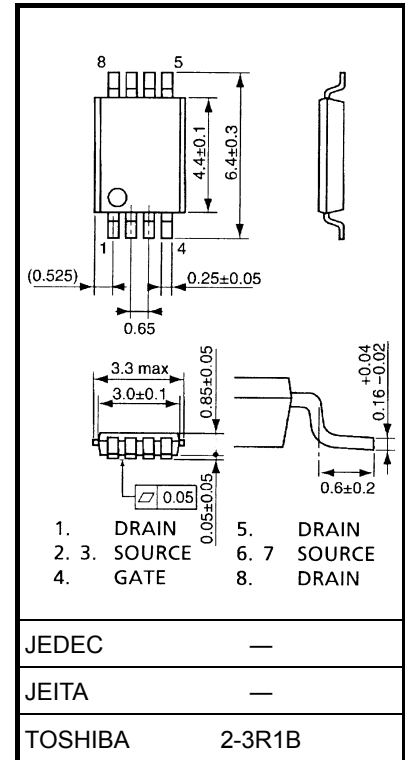
Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	-20	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	-20	V
Gate-source voltage	V_{GSS}	± 12	V
Drain current	DC (Note 1)	I_D	-6
	Pulse (Note 1)	I_{DP}	-24
Drain power dissipation ($t = 10 \text{ s}$, Note 2a)	P_D	1.5	W
Drain power dissipation ($t = 10 \text{ s}$, Note 2b)	P_D	0.6	W
Single-pulse avalanche energy (Note 3)	E_{AS}	46.8	mJ
Avalanche current	I_{AR}	-6	A
Repetitive avalanche energy (Note 2a, Note 4)	E_{AR}	0.15	mJ
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	-55 to 150	$^\circ\text{C}$

Note: For Notes 1 to 5, 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).

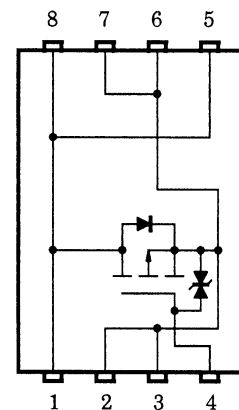
This transistor is an electrostatic-sensitive device. Handle with care.

Unit: mm



Weight: 0.035 g (typ.)

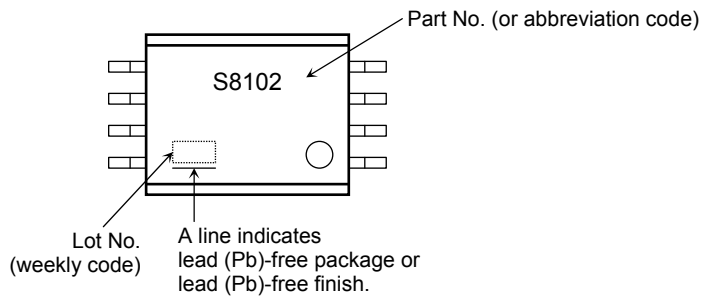
Circuit Configuration



Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s) (Note 2a)	$R_{th (ch-a)}$	83.3	°C/W
Thermal resistance, channel to ambient (t = 10 s) (Note 2b)	$R_{th (ch-a)}$	208	°C/W

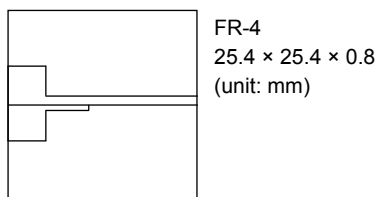
Marking (Note 5)



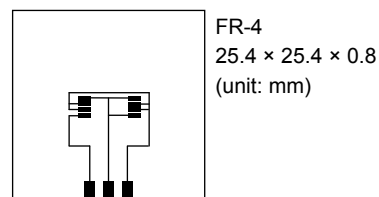
Note 1: Ensure that the channel temperature does not exceed 150°C.

Note 2:

a) Device mounted on a glass-epoxy board (a)



b) Device mounted on a glass-epoxy board (b)

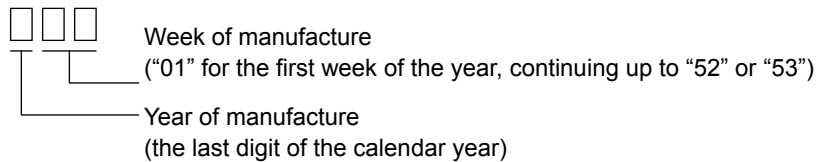


Note 3: $V_{DD} = -16\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 1.0\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = -6.0\text{ A}$

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

Note 5: ○ on the lower right of the marking indicates Pin 1.

* Weekly code: (Three digits)

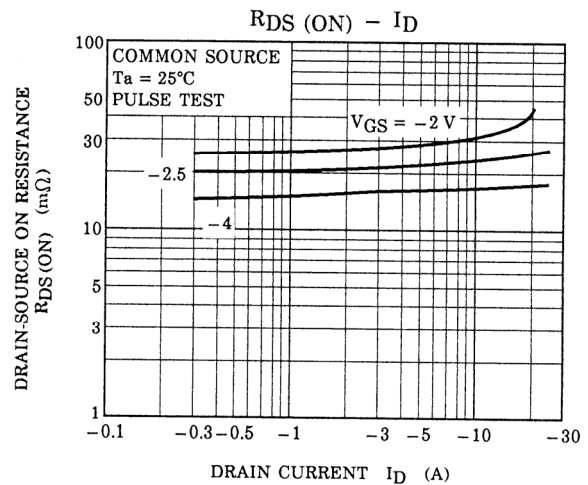
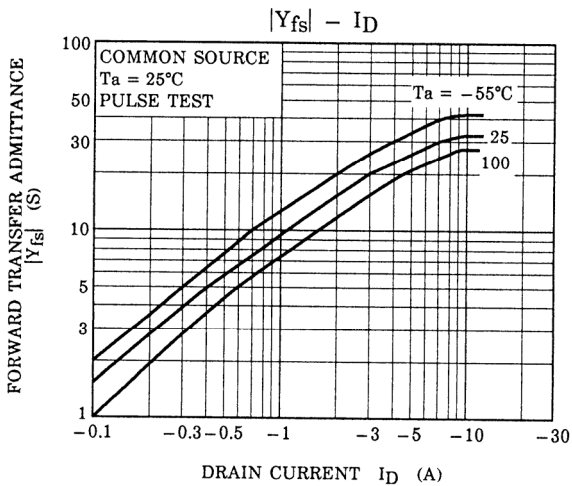
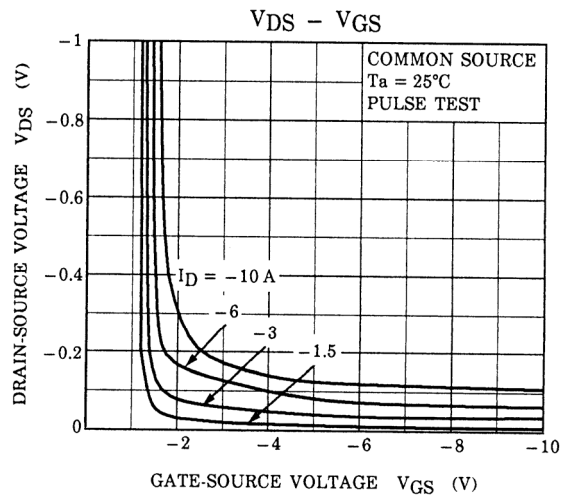
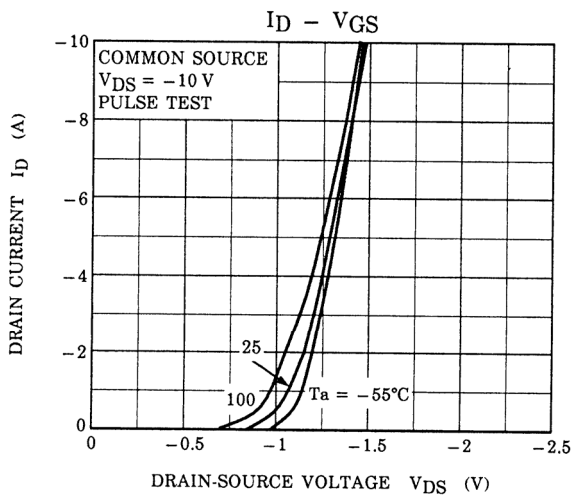
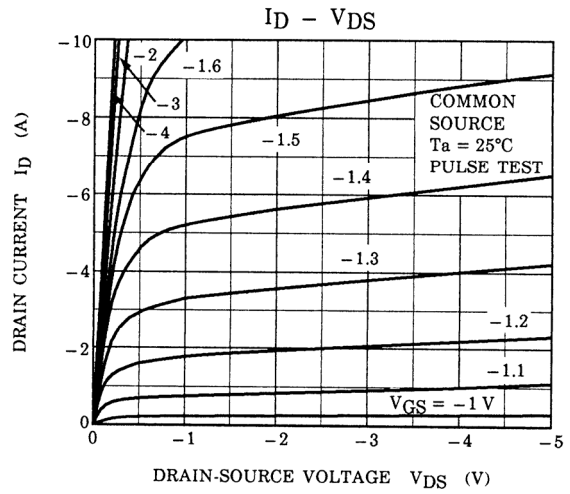
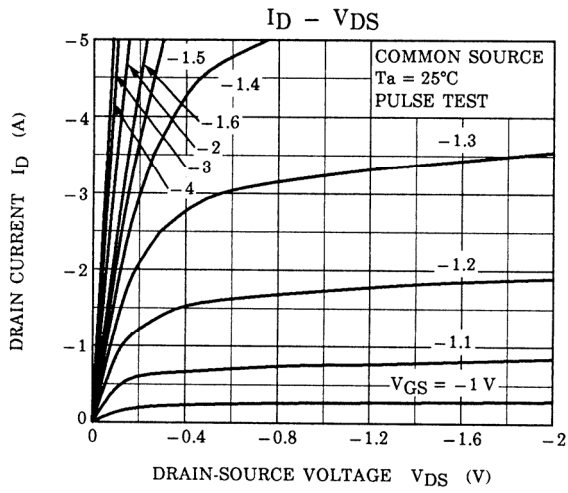


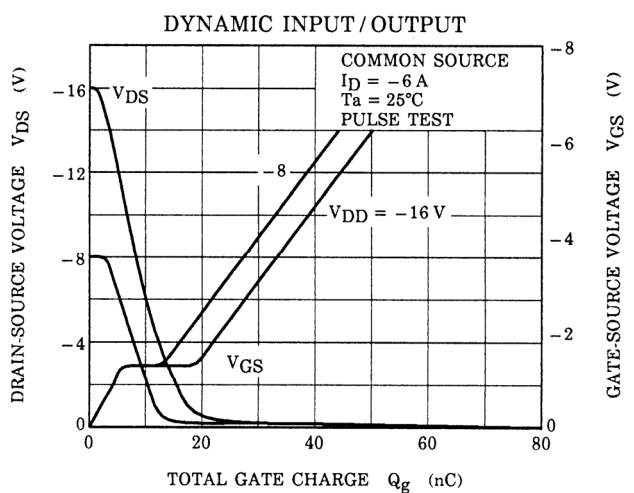
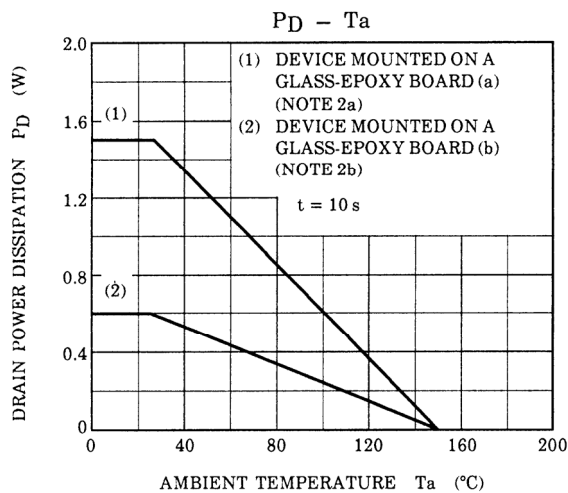
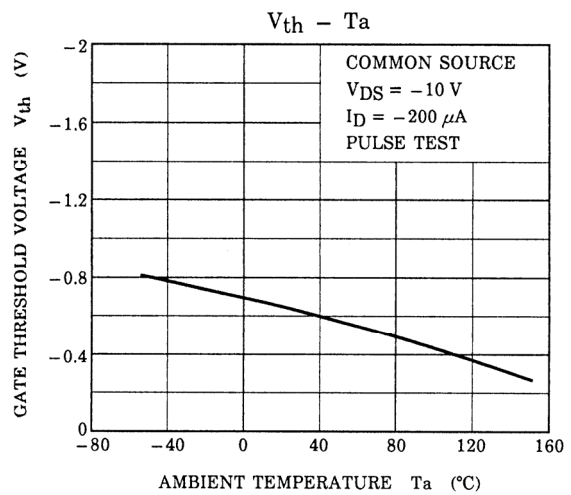
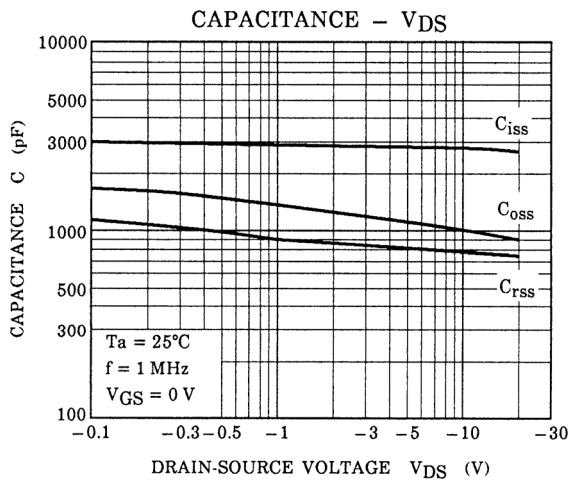
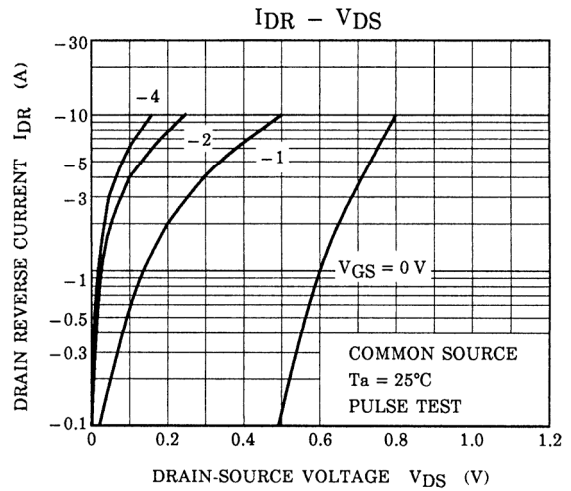
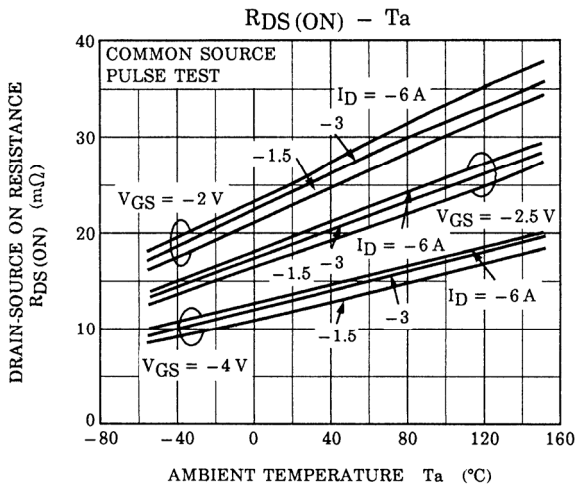
Electrical Characteristics (Ta = 25°C)

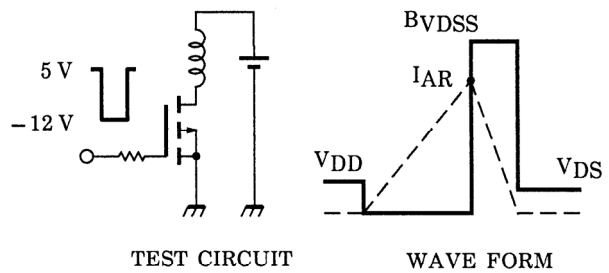
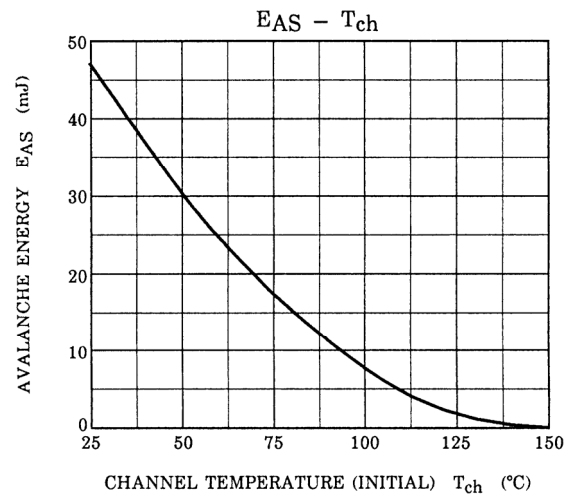
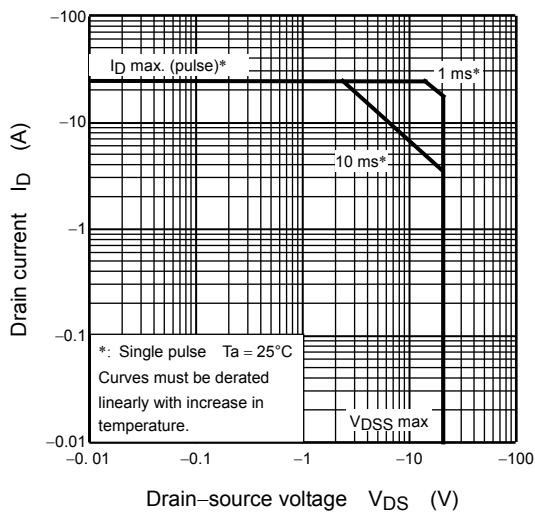
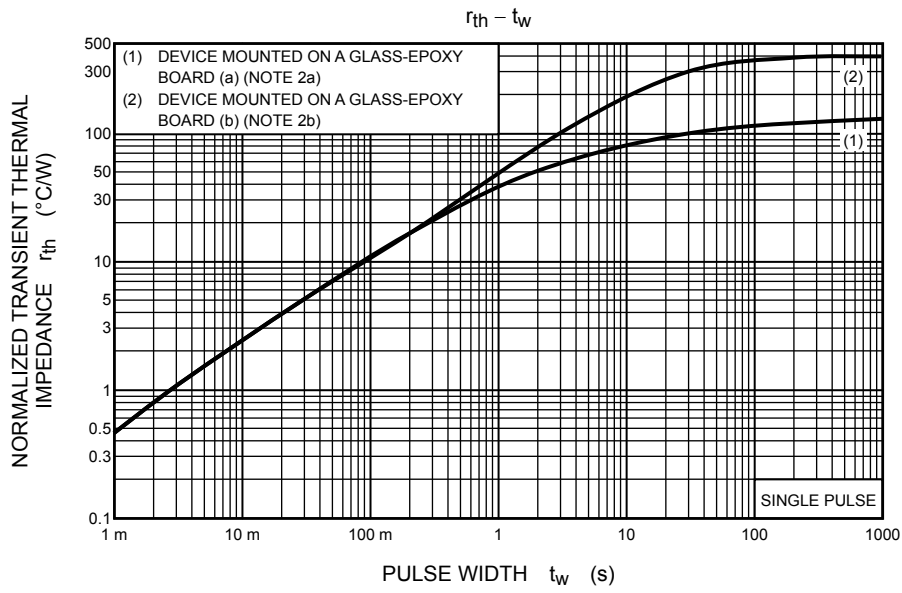
Characteristics		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 10\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 10	μA
Drain cut-off current		I_{DSS}	$V_{DS} = -20\text{ V}, V_{GS} = 0\text{ V}$	—	—	-10	μA
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = -10\text{ mA}, V_{GS} = 0\text{ V}$	-20	—	—	V
		$V_{(BR)DSX}$	$I_D = -10\text{ mA}, V_{GS} = 12\text{ V}$	-8	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = -10\text{ V}, I_D = -200\text{ }\mu\text{A}$	-0.5	—	-1.2	V
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = -2.0\text{ V}, I_D = -3\text{ A}$	—	30	60	m Ω
		$R_{DS(ON)}$	$V_{GS} = -2.5\text{ V}, I_D = -3\text{ A}$	—	23	38	
		$R_{DS(ON)}$	$V_{GS} = -4\text{ V}, I_D = -3\text{ A}$	—	16	20	
Forward transfer admittance		$ Y_{fs} $	$V_{DS} = -10\text{ V}, I_D = -3\text{ A}$	8.5	17	—	S
Input capacitance		C_{iss}	$V_{DS} = -10\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	2740	—	pF
Reverse transfer capacitance		C_{rss}		—	780	—	pF
Output capacitance		C_{oss}		—	1030	—	pF
Switching time	Rise time	t_r		—	7.6	—	ns
	Turn-on time	t_{on}		—	16	—	
	Fall time	t_f		—	110	—	
	Turn-off time	t_{off}		Duty $\leq 1\%$, $t_w = 10\text{ }\mu\text{s}$	—	230	
Total gate charge (gate-source plus gate-drain)		Q_g	$V_{DD} \approx -16\text{ V}, V_{GS} = -5\text{ V}, I_D = -6\text{ A}$	—	37	—	nC
Gate-source charge		Q_{gs}		—	27	—	nC
Gate-drain ("miller") charge		Q_{gd}		—	10	—	nC

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

Characteristics		Symbol	Test Condition	Min.	Typ.	Max.	Unit
Drain reverse current	Pulse (Note 1)	I_{DRP}	—	—	—	-24	A
Forward voltage (diode)		V_{DSF}	$I_{DR} = -6\text{ A}, V_{GS} = 0\text{ V}$	—	—	1.2	V







$T_{ch} = 25^{\circ}C$ (Initial)
 Peak $I_{AR} = -6$ A, $R_G = 25 \Omega$ $E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BVDSS}{BVDSS - V_{DD}} \right)$
 $V_{DD} = -16$ V, $L = 1.0$ mH

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