

TOSHIBA Field Effect Transistor Silicon N Channel MOS Type (U-MOSII)

TPC8203

Lithium Ion Battery Applications
 Portable Equipment Applications
 Notebook PC Applications

- Small footprint due to small and thin package
- Low drain-source ON resistance : $R_{DS(ON)} = 14 \text{ m}\Omega$ (typ.)
- High forward transfer admittance : $|Y_{fs}| = 8 \text{ S}$ (typ.)
- Low leakage current : $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 30 \text{ V}$)
- Enhancement mode : $V_{th} = 0.8\sim 2.5 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

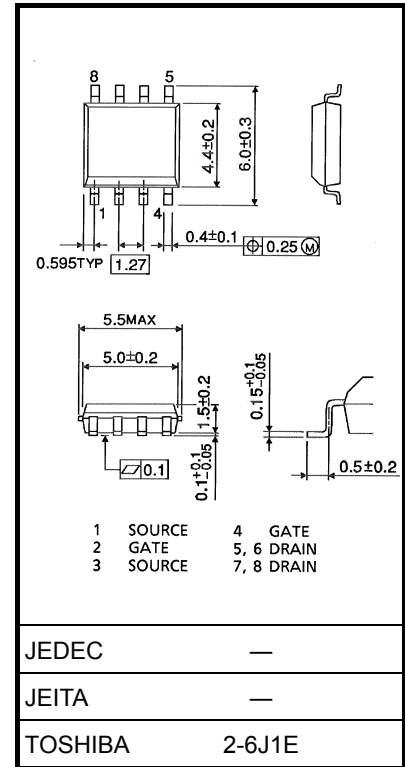
Characteristics	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	30	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	30	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	D C (Note 1)	I_D	6
	Pulse (Note 1)	I_{DP}	24
Drain power dissipation ($t = 10 \text{ s}$) (Note 2a)	Single-device operation (Note 3a)	$P_D(1)$	1.5
	Single-device value at dual operation (Note 3b)	$P_D(2)$	1.0
Drain power dissipation ($t = 10 \text{ s}$) (Note 2b)	Single-device operation (Note 3a)	$P_D(1)$	0.75
	Single-device value at dual operation (Note 3b)	$P_D(2)$	0.45
Single pulse avalanche energy (Note 4)	E_{AS}	46.8	mJ
Avalanche current	I_{AR}	6	A
Repetitive avalanche energy (Note 2a, Note 3b, Note 5)	E_{AR}	0.10	mJ
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	$-55\sim 150$	$^\circ\text{C}$

Note: Note 1, Note 2a, Note 2b, Note 3a, Note 3b, Note 4 and Note 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).

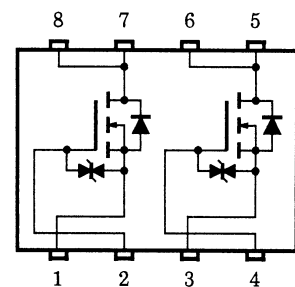
This transistor is an electrostatic-sensitive device. Please handle with caution.

Unit: mm



Weight: 0.080 g (typ.)

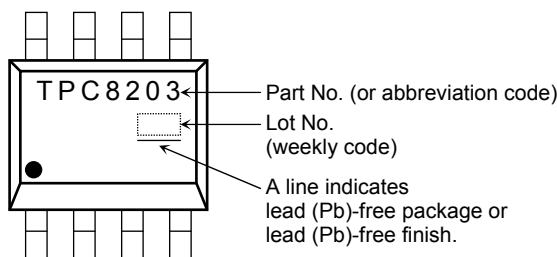
Circuit Configuration



Thermal Characteristics

Characteristics		Symbol	Max	Unit
Thermal resistance, channel to ambient (t = 10 s)	Single-device operation (Note 3a)	$R_{th(ch-a)}(1)$	83.3	°C/W
	Single-device value at dual operation (Note 3b)	$R_{th(ch-a)}(2)$	125	
Thermal resistance, channel to ambient (t = 10 s)	Single-device operation (Note 3a)	$R_{th(ch-a)}(1)$	167	
	Single-device value at dual operation (Note 3b)	$R_{th(ch-a)}(2)$	278	

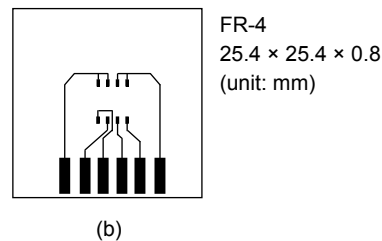
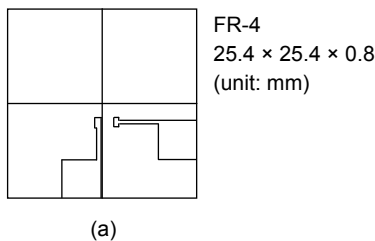
Marking



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:

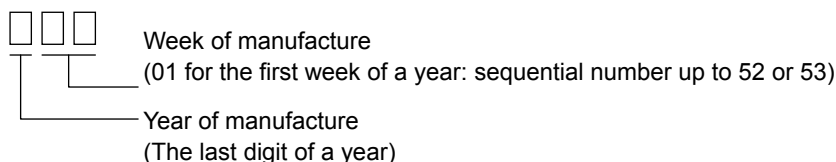
- a) The power dissipation and thermal resistance values are shown for a single device (During single-device operation, power is only applied to one device.)
 b) The power dissipation and thermal resistance values are shown for a single device (During dual operation, power is evenly applied to both devices.)

Note 4: $V_{DD} = 24\text{ V}$, $T_{ch} = 25^\circ\text{C}$ (Initial), $L = 1.0\text{ mH}$, $R_G = 25\ \Omega$, $I_{AR} = 6.0\text{ A}$

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

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

※ Weekly code: (Three digits)

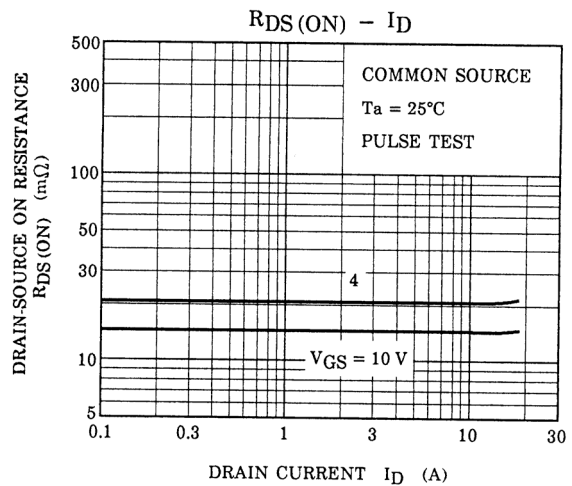
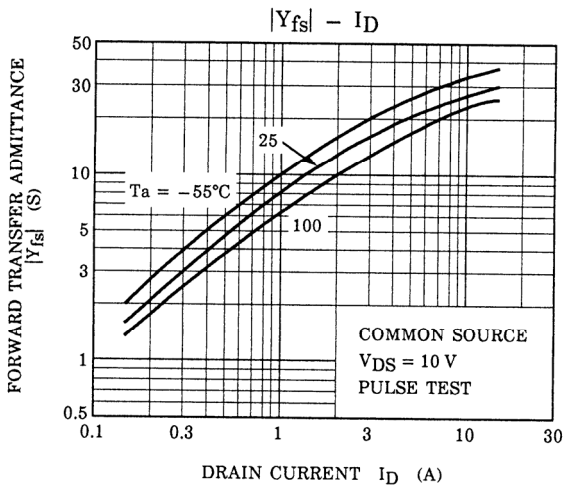
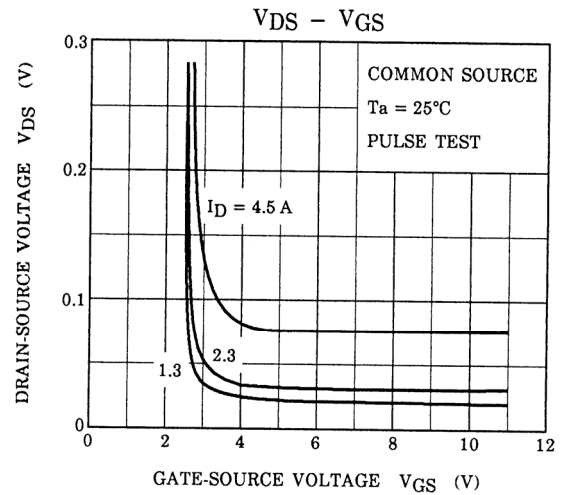
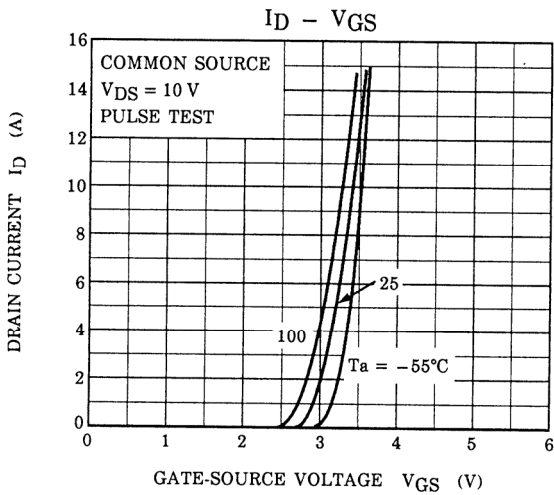
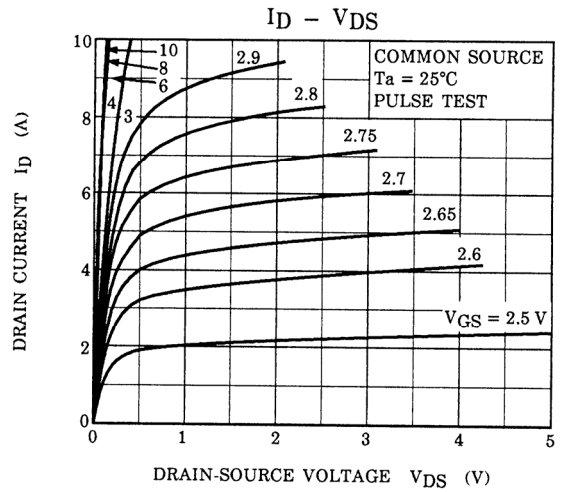
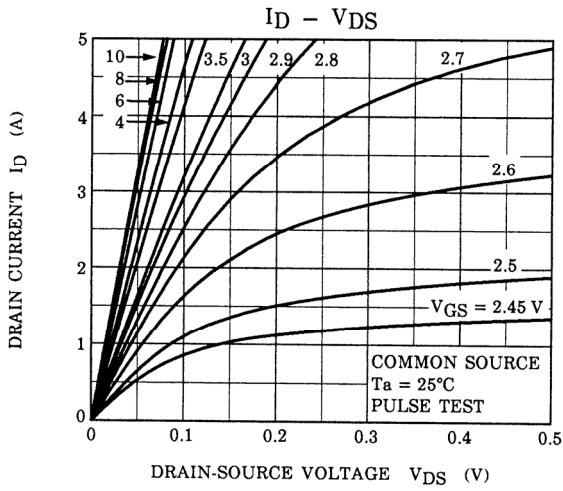


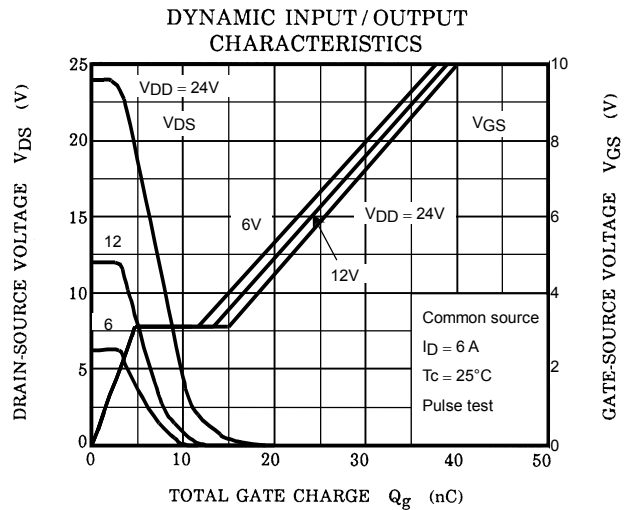
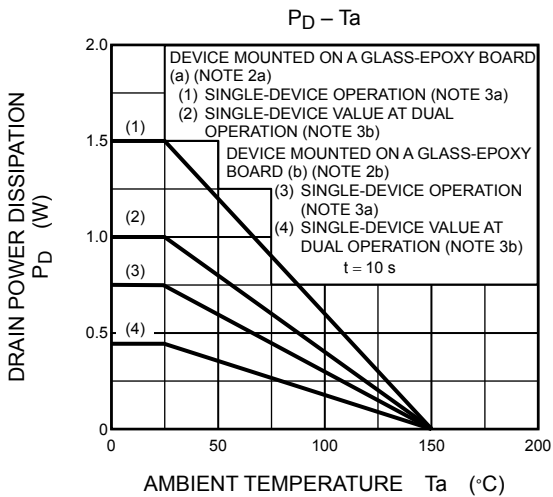
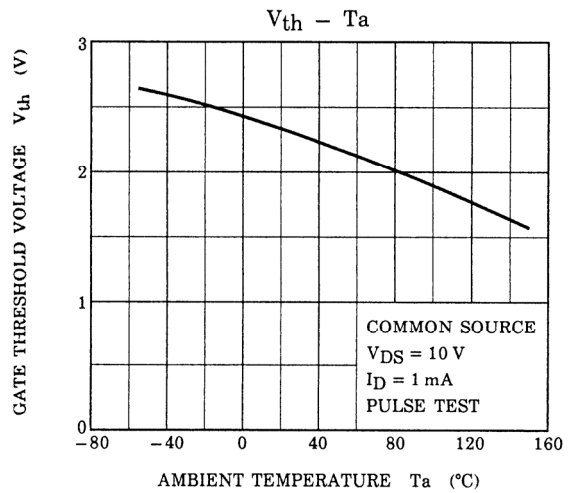
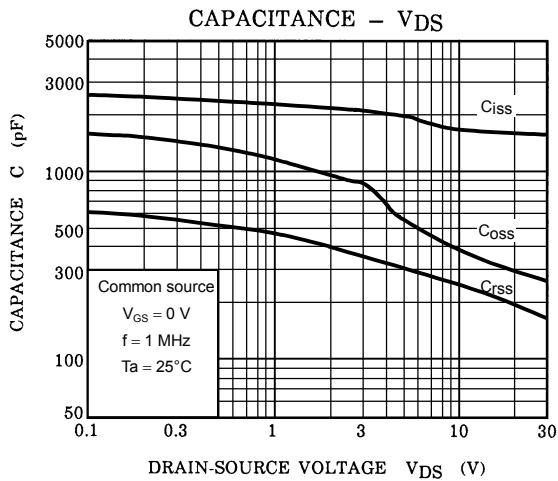
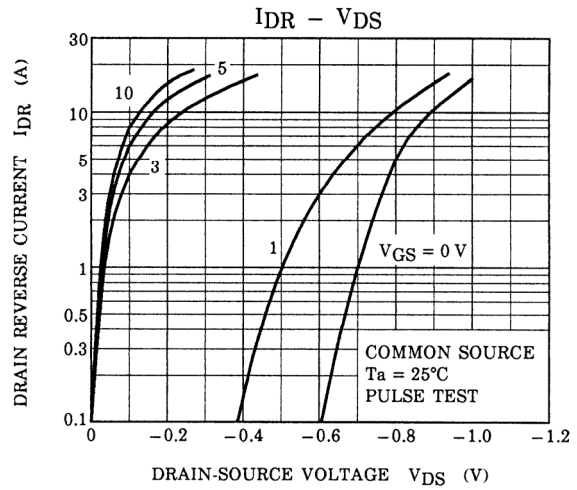
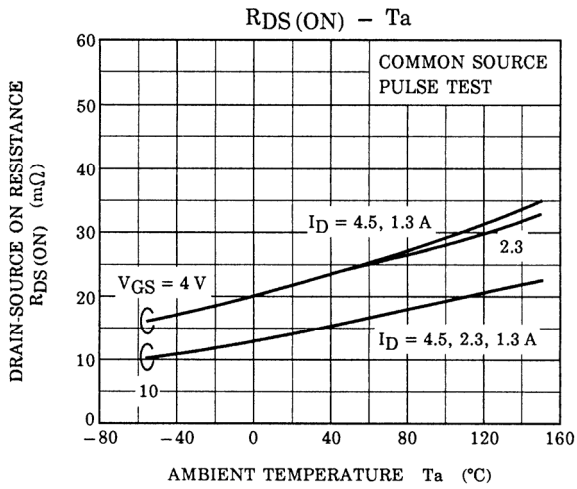
Electrical Characteristics (Ta = 25°C)

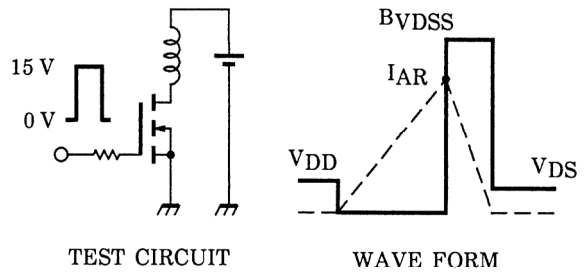
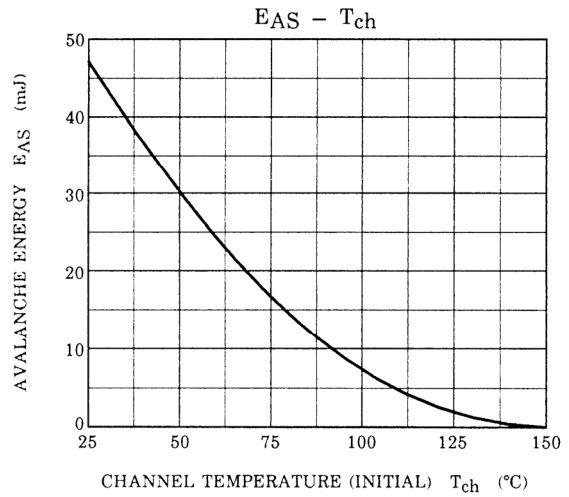
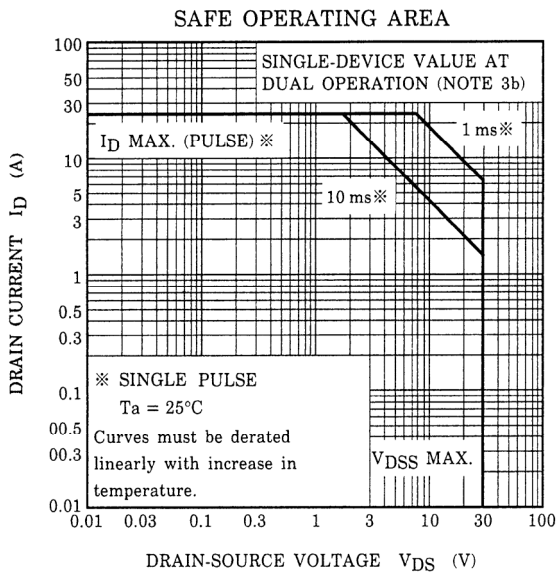
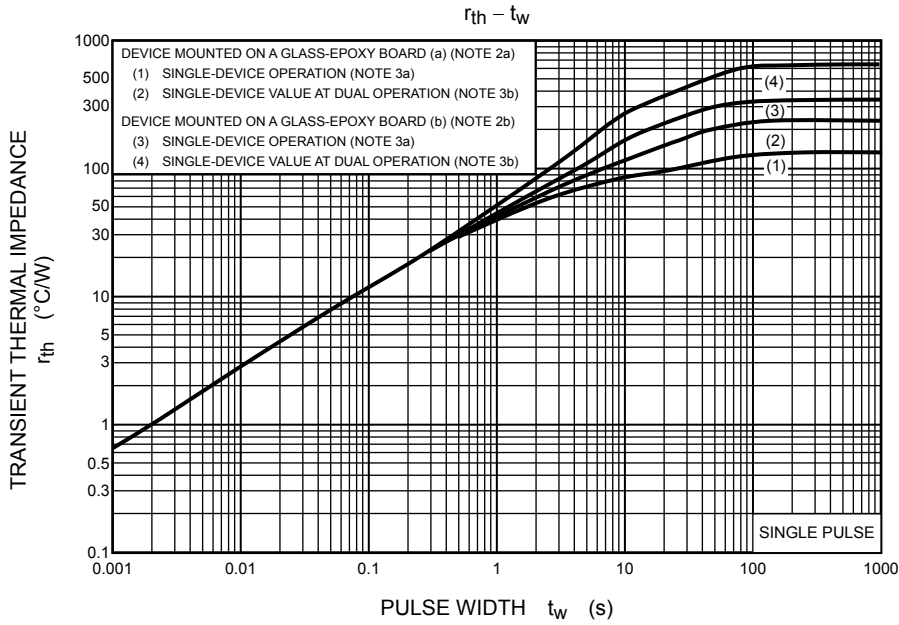
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		IGSS	VGS = ±16 V, VDS = 0 V	—	—	±10	μA
Drain cut-OFF current		IDSS	VDS = 30 V, VGS = 0 V	—	—	10	μA
Drain-source breakdown voltage		V(BR) DSS	ID = 10 mA, VGS = 0 V	30	—	—	V
		V(BR) DSX	ID = 10 mA, VGS = -20 V	15	—	—	
Gate threshold voltage		Vth	VDS = 10 V, ID = 1 mA	0.8	—	2.5	V
Drain-source ON resistance		RDS (ON)	VGS = 4 V, ID = 3 A	—	22	32	mΩ
		RDS (ON)	VGS = 10 V, ID = 3 A	—	14	21	
Forward transfer admittance		Yfs	VDS = 10 V, ID = 3 A	4	8	—	S
Input capacitance		Ciss	VDS = 10 V, VGS = 0 V, f = 1 MHz	—	1700	—	pF
Reverse transfer capacitance		Crss		—	260	—	
Output capacitance		Coss		—	380	—	
Switching time	Rise time	tr	<p> $V_{GS} = 10\text{ V}$ 0 V $I_D = 3.0\text{ A}$ V_{OUT} $R_L = 5.0\ \Omega$ $V_{DD} \doteq 15\text{ V}$ $\text{Duty} \leq 1\%$, $t_w = 10\ \mu\text{s}$ </p>	—	10	—	ns
	Turn-ON time	ton		—	20	—	
	Fall time	tf		—	35	—	
	Turn-OFF time	toff		—	120	—	
Total gate charge (Gate-source plus gate-drain)		Qg	VDD ≈ 24 V, VGS = 10 V, ID = 6 A	—	40	—	nC
Gate-source charge		Qgs		—	28	—	
Gate-drain ("miller") charge		Qgd		—	12	—	

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

Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	Pulse (Note 1)	IDRP	—	—	—	24	A
Forward voltage (diode)		VDSF	IDR = 6 A, VGS = 0 V	—	—	-1.2	V







$T_{ch} = 25^{\circ}\text{C}$ (Initial)
 Peak $I_{AR} = 4.5\text{ A}$, $R_G = 25\ \Omega$ $E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{BV_{DS}}{BV_{DS} - V_{DD}} \right)$
 $V_{DD} = 24\text{ V}$, $L = 1.0\text{ mH}$

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