

TOSHIBA Field Effect Transistor Silicon N-Channel MOS Type (Ultra-High-Speed U-MOSIII)

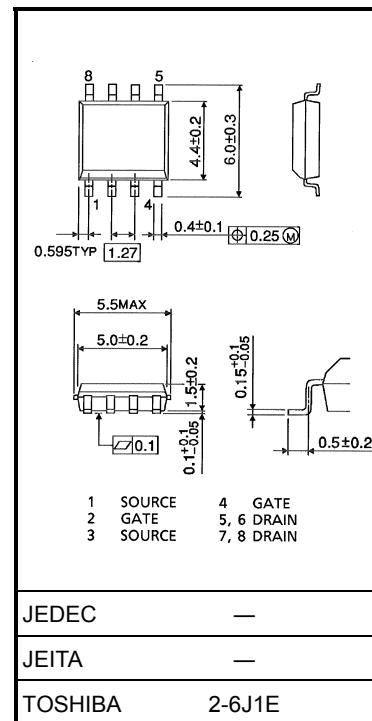
TPC8214-H**High-Efficiency DC/DC Converter Applications
CCFL Inverters**

Unit: mm

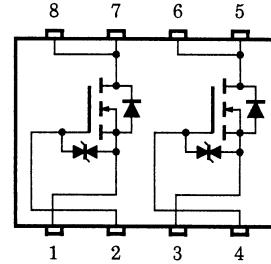
- Small footprint due to a small and thin package
- High-speed switching
- Small gate charge: $Q_{SW} = 2.0 \text{ nC}$ (typ.)
- Low drain-source ON-resistance: $R_{DS(ON)} = 130 \text{ m}\Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 5.4 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 10 \mu\text{A}$ (max) ($V_{DS} = 100 \text{ V}$)
- Enhancement mode: $V_{th} = 1.1$ to 2.3 V ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

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

Characteristic	Symbol	Rating	Unit
Drain-source voltage	V_{DSS}	100	V
Drain-gate voltage ($R_{GS} = 20 \text{ k}\Omega$)	V_{DGR}	100	V
Gate-source voltage	V_{GSS}	± 20	V
Drain current	D C (Note 1)	I_D	2.2
	Pulse (Note 1)	I_{DP}	8.8
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)	$P_D(2)$	1.1
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}	3.9	mJ
Avalanche current	I_{AR}	2.2	A
Repetitive avalanche energy (Note 2a, Note 3b, Note 5)	E_{AR}	0.026	mJ
Channel temperature	T_{ch}	150	$^\circ\text{C}$
Storage temperature range	T_{stg}	$-55 \sim 150$	$^\circ\text{C}$



Weight: 0.085 g (typ.)

Circuit Configuration

Note: For Notes 1 to 5, refer to the next page.

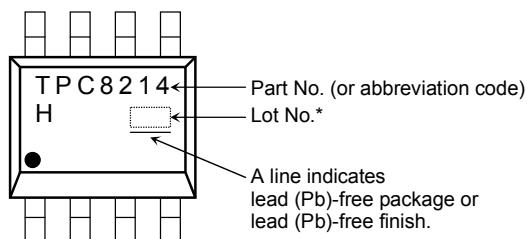
Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within 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.

Thermal Characteristics

Characteristic		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)	114	
Thermal resistance, channel to ambient ($t = 10$ s)	Single-device operation (Note 3a)	R_{th} (ch-a) (1)	167	°C/W
	Single-device value at dual operation (Note 3b)	R_{th} (ch-a) (2)	278	

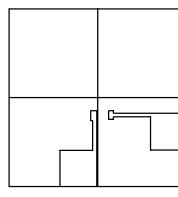
Marking



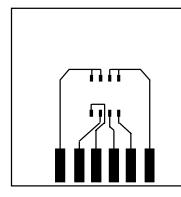
Note 1: The channel temperature should not exceed 150°C during use.

Note 2:

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



(a)



(b)

FR-4
25.4 × 25.4 × 0.8
(unit: mm)

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.)

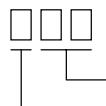
b) The power dissipation and thermal resistance values are shown for a single device
(During dual operation, power is evenly applied to both devices.)

Note 4: $V_{DD} = 50$ V, $T_{ch} = 25^\circ\text{C}$ (Initial), $L = 1.0$ mH, $R_G = 25 \Omega$, $I_{AR} = 2.2$ A

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

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

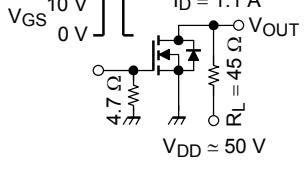
* Weekly code: (Three digits)



Week of manufacture
(01 for first week of year, continuing up to 52 or 53)

Year of manufacture
(The last digit of the calendar year)

Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I _{GSS}	V _{GS} = ±16 V, V _{DS} = 0 V	—	—	±10	μA
Drain cutoff current	I _{DSS}	V _{DS} = 100 V, V _{GS} = 0 V	—	—	10	μA
Drain-source breakdown voltage	V _{(BR) DSS}	I _D = 10 mA, V _{GS} = 0 V	100	—	—	V
	V _{(BR) DSX}	I _D = 10 mA, V _{GS} = -20 V	60	—	—	
Gate threshold voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	1.1	—	2.3	V
Drain-source ON-resistance	R _{DS (ON)}	V _{GS} = 4.5 V, I _D = 1.1 A	—	140	190	mΩ
	R _{DS (ON)}	V _{GS} = 10 V, I _D = 1.1 A	—	130	180	
Forward transfer admittance	Y _{fs}	V _{DS} = 10 V, I _D = 1.1 A	2.7	5.4	—	S
Input capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	360	—	pF
Reverse transfer capacitance	C _{rss}		—	22	—	
Output capacitance	C _{oss}		—	75	—	
Switching time	Rise time	t _r	 V _{GS} 10 V 0 V I _D = 1.1 A V _{OUT} 4.7 Ω R _L = 45 Ω V _{DD} ≈ 50 V Duty ≤ 1%, t _w = 10 μs	—	7	ns
	Turn-on time	t _{on}		—	14	
	Fall time	t _f		—	3	
	Turn-off time	t _{off}		—	17	
Total gate charge (gate-source plus gate-drain) (Note 7)	Q _g	V _{DD} ≈ 80 V, V _{GS} = 10 V, I _D = 2.2 A	—	7.5	—	nC
		V _{DD} ≈ 80 V, V _{GS} = 5 V, I _D = 2.2 A	—	4.5	—	
Gate-source charge 1	Q _{gs1}	V _{DD} ≈ 80 V, V _{GS} = 10 V, I _D = 2.2 A	—	1.6	—	
Gate-drain ("Miller") charge	Q _{gd}		—	1.3	—	
Gate switch charge	Q _{SW}		—	2.0	—	

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

Characteristic	Symbol	Test Condition	Min	Typ.	Max	Unit
Drain reverse current	I _{DRP}	—	—	—	8.8	A
Forward voltage (diode)	V _{DSF}	I _{DR} = 2.2 A, V _{GS} = 0 V	—	—	-1.2	V

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