

TK20A60T

Switching Regulator Applications

- Low drain-source ON resistance: $R_{DS(ON)} = 0.165 \Omega$ (typ.)
- High forward transfer admittance: $|Y_{fs}| = 12 \text{ S}$ (typ.)
- Low leakage current: $I_{DSS} = 100 \mu\text{A}$ ($V_{DS} = 600 \text{ V}$)
- Enhancement-mode: $V_{th} = 3.0 \text{ to } 5.0 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1 \text{ mA}$)

Absolute Maximum Ratings (Ta = 25°C)

Characteristics	Symbol	Rating	Unit
Drain-source voltage	V _{DSS}	600	V
Gate-source voltage	V _{GSS}	±30	V
Drain current	DC (Note 1)	I _D	20
	Pulse (t = 1 ms) (Note 1)	I _{DP}	40
Drain power dissipation (T _c = 25°C)	P _D	45	W
Single pulse avalanche energy (Note 2)	E _{AS}	209	mj
Avalanche current	I _{AR}	20	A
Repetitive avalanche energy (Note 3)	E _{AR}	4.5	mJ
Channel temperature	T _{ch}	150	°C
Storage temperature range	T _{stg}	-55 to 150	°C

Weight : 1.7 g (typ.)

Note: 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).

Thermal Characteristics

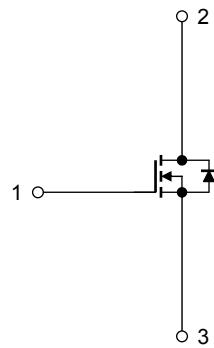
Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	R_{th} (ch-c)	2.78	°C/W
Thermal resistance, channel to ambient	R_{th} (ch-a)	62.5	°C/W

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

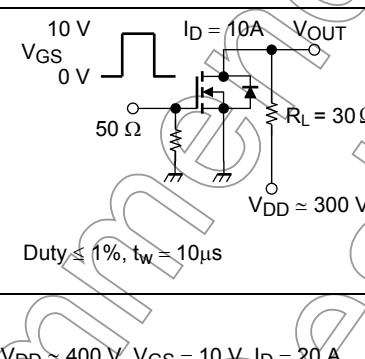
Note 2: $V_{DD} = 90$ V, $T_{ch} = 25$ °C (initial), $L = 0.91$ mH, $R_G = 25$ Ω, $I_{AR} = 20$ A

Note 3: Repetitive rating: pulse width limited by maximum channel temperature

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



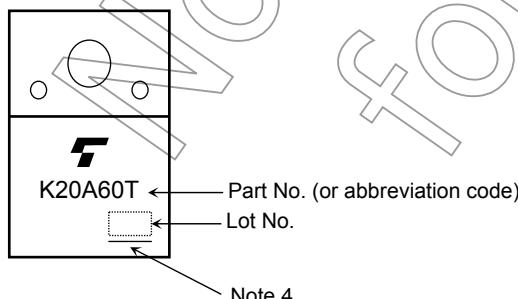
Electrical Characteristics (Ta = 25°C)

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current	I _{GSS}	V _{GS} = ±30 V, V _{DS} = 0 V	—	—	±1	µA
Drain cut-off current	I _{DSS}	V _{DS} = 600 V, V _{GS} = 0 V	—	—	100	µA
Drain-source breakdown voltage	V _{(BR) DSS}	I _D = 10 mA, V _{GS} = 0 V	600	—	—	V
Gate threshold voltage	V _{th}	V _{DS} = 10 V, I _D = 1 mA	3.0	—	5.0	V
Drain-source ON resistance	R _{DS} (ON)	V _{GS} = 10 V, I _D = 10 A	—	0.165	0.19	Ω
Forward transfer admittance	Y _{fs}	V _{DS} = 10 V, I _D = 10 A	3	12	—	S
Input capacitance	C _{iss}	V _{DS} = 10 V, V _{GS} = 0 V, f = 1 MHz	—	1580	—	pF
Reverse transfer capacitance	C _{rss}		—	175	—	
Output capacitance	C _{oss}		—	3800	—	
Switching time	Rise time	t _r		—	40	—
	Turn-on time	t _{on}		—	75	—
	Fall time	t _f		—	10	—
	Turn-off time	t _{off}		—	120	—
Total gate charge	Q _g	V _{DD} ≈ 400 V, V _{GS} = 10 V, I _D = 20 A	—	30	—	nC
Gate-source charge	Q _{gs}		—	17	—	
Gate-drain charge	Q _{gd}		—	13	—	

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

Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Note 1)	I _{DR}	—	—	—	20	A
Pulse drain reverse current (Note 1)	I _{DRP}	—	—	—	40	A
Forward voltage (diode)	V _{DSF}	I _{DR} = 20 A, V _{GS} = 0 V	—	—	-1.7	V
Reverse recovery time	t _{rr}	I _{DR} = 20 A, V _{GS} = 0 V, dI _{DR} /dt = 100 A/µs	—	500	—	ns
Reverse recovery charge	Q _{rr}		—	11	—	µC

Marking

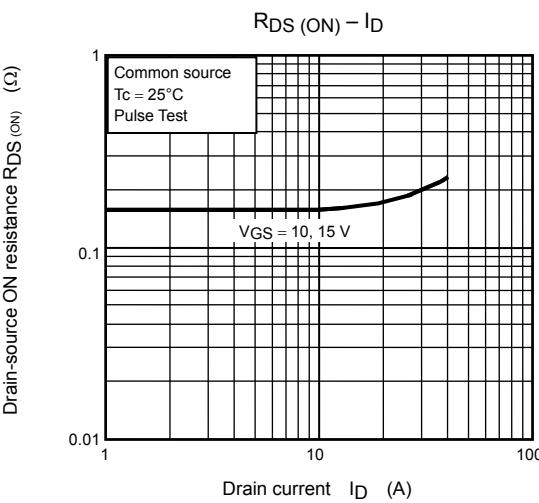
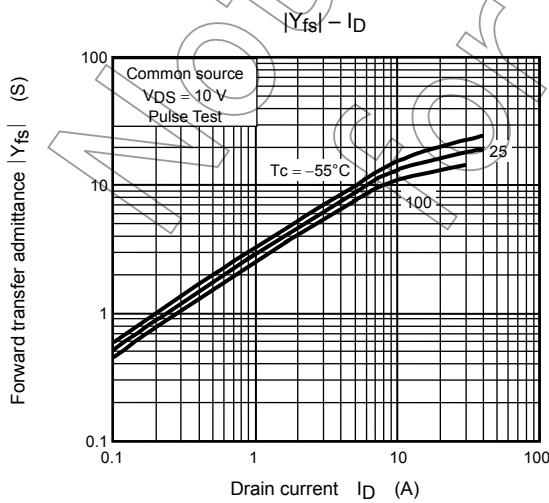
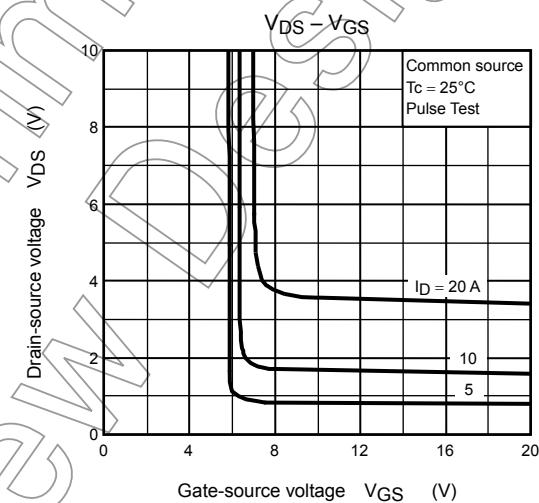
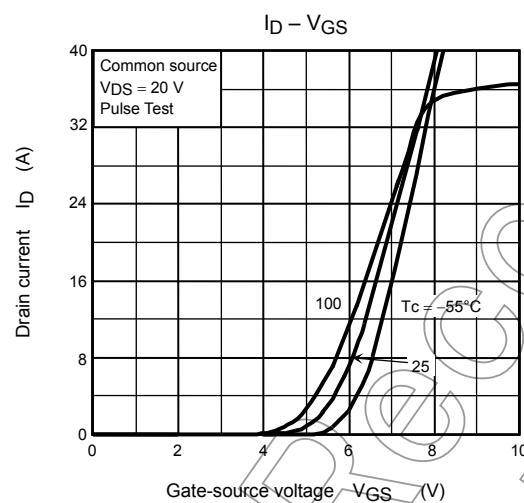
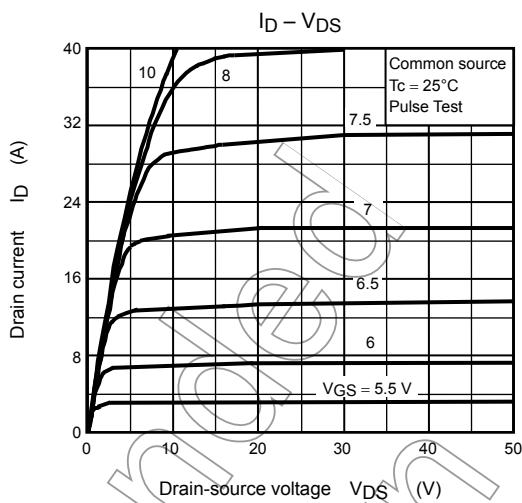
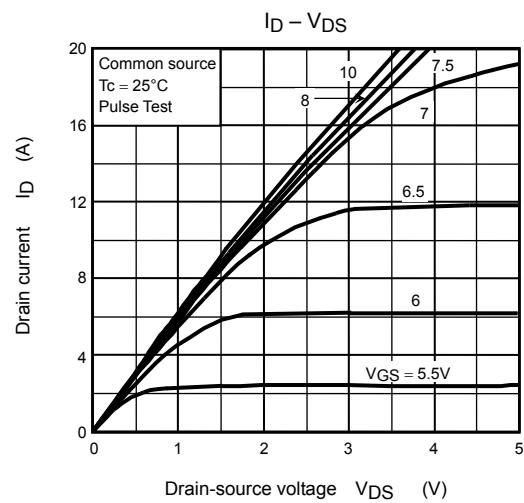


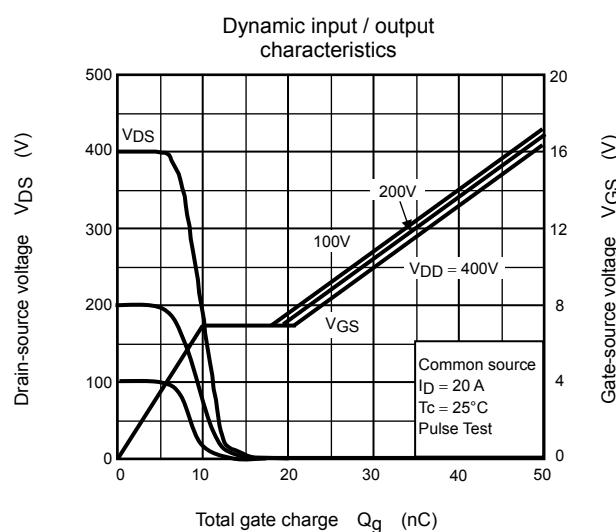
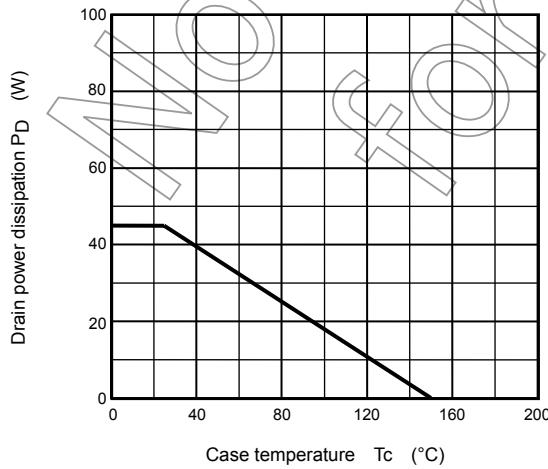
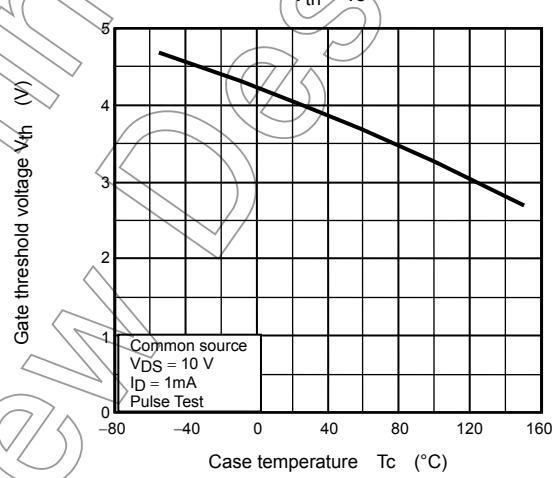
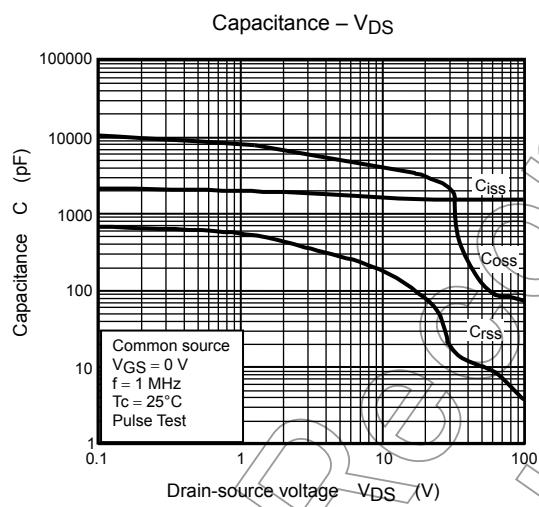
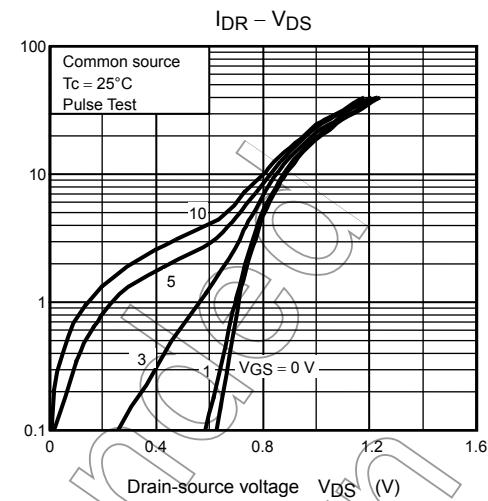
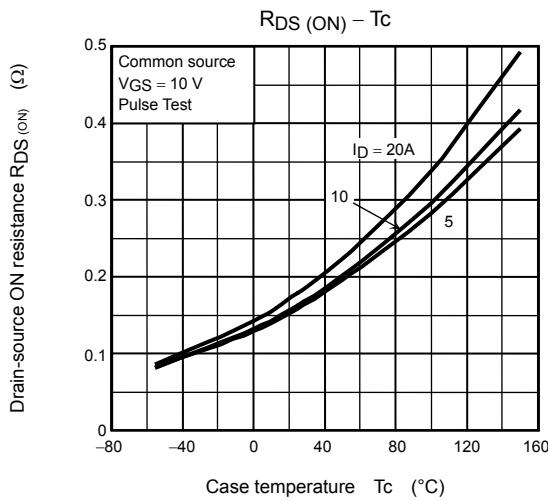
Note 4: A line under a Lot No. identifies the indication of product Labels.

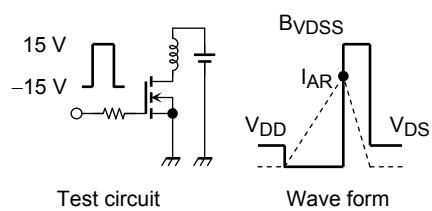
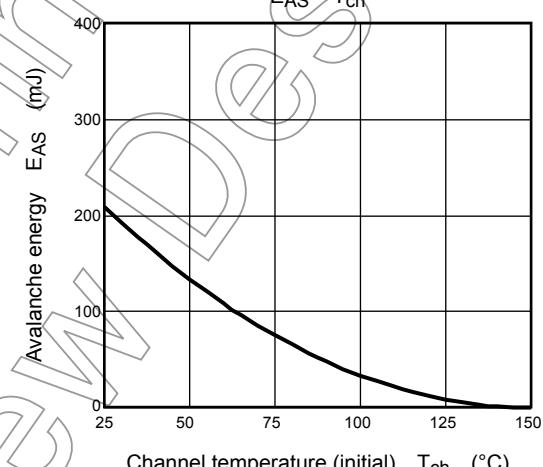
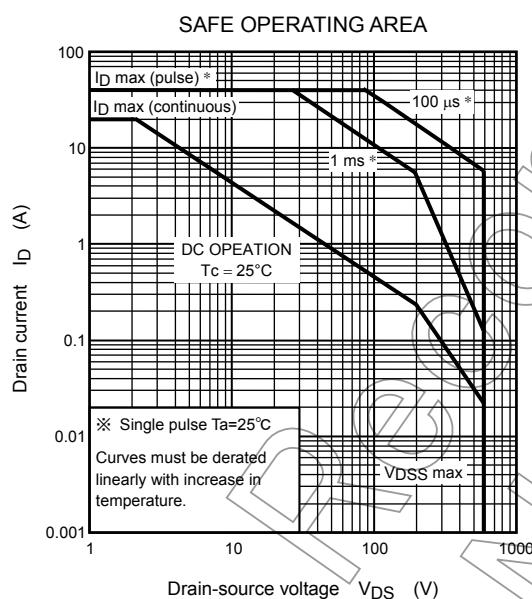
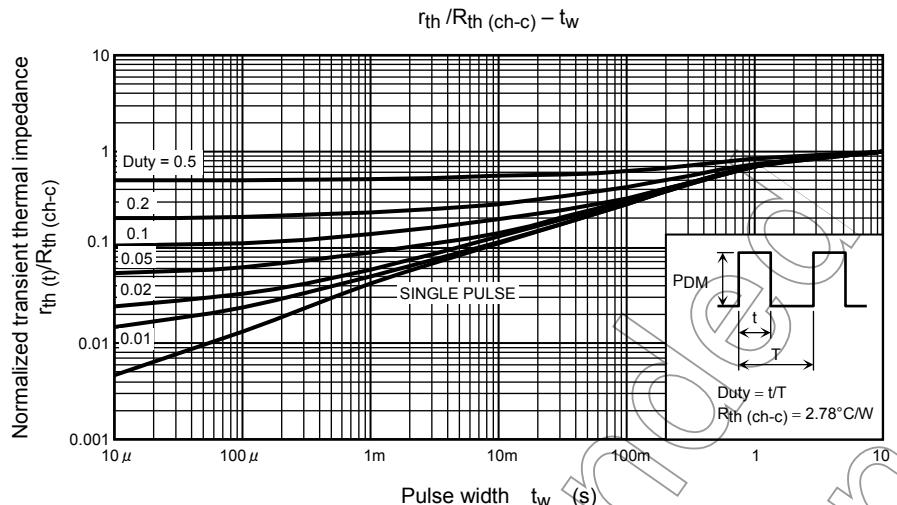
Not underlined: [[Pb]]/INCLUDES > MCV

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

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$$R_G = 25 \Omega$$

$$V_{DD} = 90 \text{ V}, L = 0.91 \text{ mH}$$

$$E_{AS} = \frac{1}{2} \cdot L \cdot I^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$

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