

TK150E09NE

■ E·Bike

- Low drain-source ON resistance : $R_{DS(ON)} = 3.6 \text{ m}\Omega$ (typ.) ($V_{GS} = 10 \text{ V}$)
- Low leakage current : $I_{DSS} = 10 \text{ }\mu\text{A}$ (max) ($V_{DS} = 85 \text{ V}$)
- Enhancement mode : $V_{th} = 2.5\sim 4.5 \text{ V}$ ($V_{DS} = 10 \text{ V}$, $I_D = 1.0 \text{ mA}$)

Absolute Maximum Ratings (Ta = 25°C)

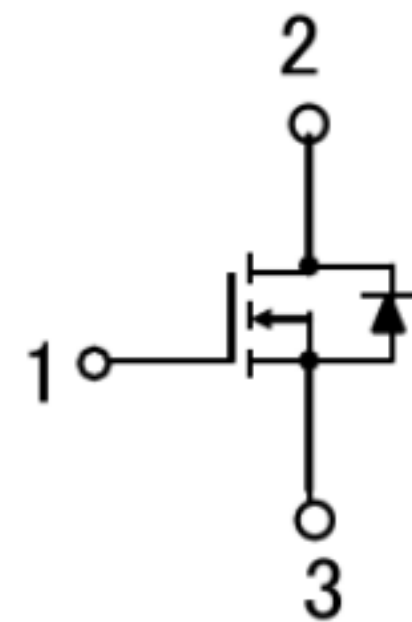
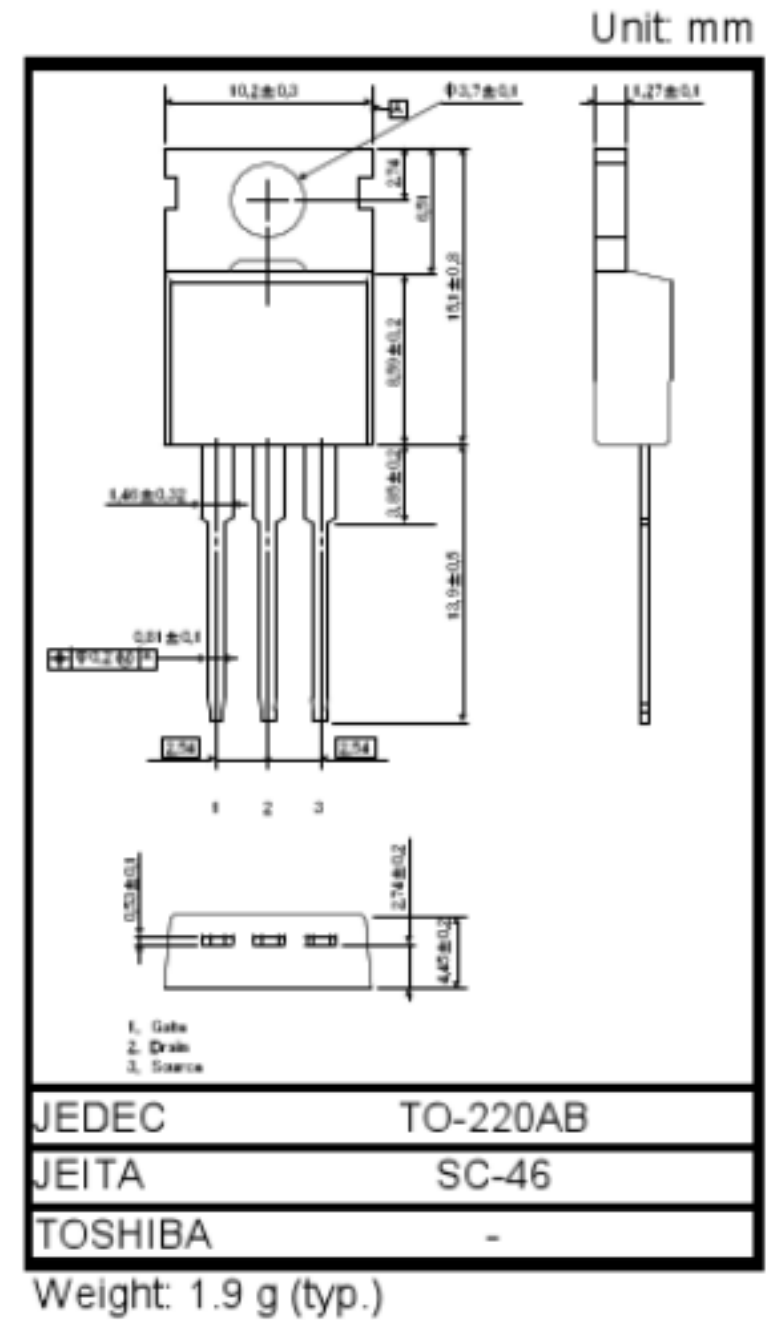
Characteristics		Symbol	Rating	Unit
Drain-source voltage		V_{DSS}	85	V
Gate-source voltage		V_{GSS}	± 20	
Drain current	DC (Tc = 25°C) (Note 1)	I_D	150	A
	DC (Tc = 100°C) (Note 1)	I_D	120	
	Pulse (Note 1)	I_{DP}	450	
Drain power dissipation (Tc = 25°C)		P_D	230	W
Single pulse avalanche energy (Note 2)		E_{AS}	161	mJ
Avalanche current (Note 2)		I_{AS}	72	A
Peak diode recovery dv/dt (Note 5)		dv/dt	12	V/ns
Channel temperature		T_{ch}	175	°C
Storage temperature range		T_{stg}	-55~175	

Thermal Characteristics

Characteristics	Symbol	Max	Unit
Thermal resistance, channel to case	$R_{th(ch-c)}$	0.65	°C / W
Thermal resistance, channel to ambient	$R_{th(ch-a)}$	83.3	

- Note 1: Ensure that the channel temperature does not exceed 175°C.
 Note 2: $V_{DD} = 64 \text{ V}$, $T_{ch} = 25^\circ\text{C}$ (initial), $L = 24 \text{ }\mu\text{H}$, $R_G = 25 \text{ }\Omega$, $I_{AS} = 72 \text{ A}$
 Note 3: Repetitive rating: pulse width limited by maximum channel temperature
 Note 4: $I_{DR} \leq 180 \text{ A}$, $di/dt \leq 160 \text{ A}/\mu\text{s}$, $T_{ch} \leq T_{ch \text{ max}}$.
 This transistor is an electrostatic-sensitive device.
 Please handle with caution.

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



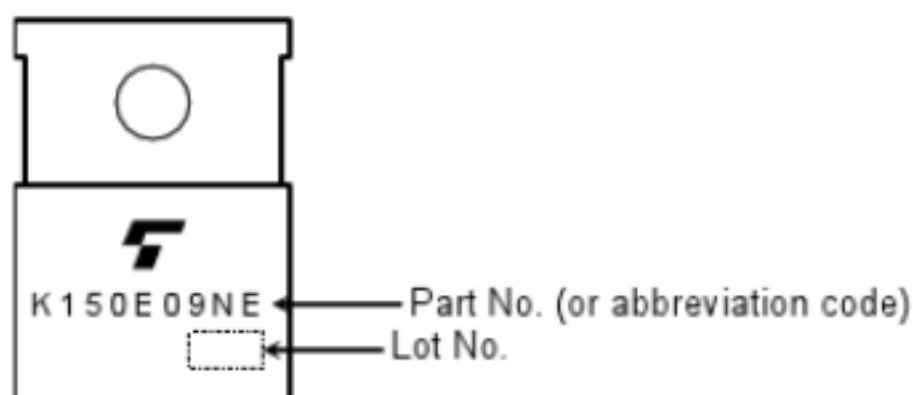
Electrical Characteristics (Ta = 25°C)

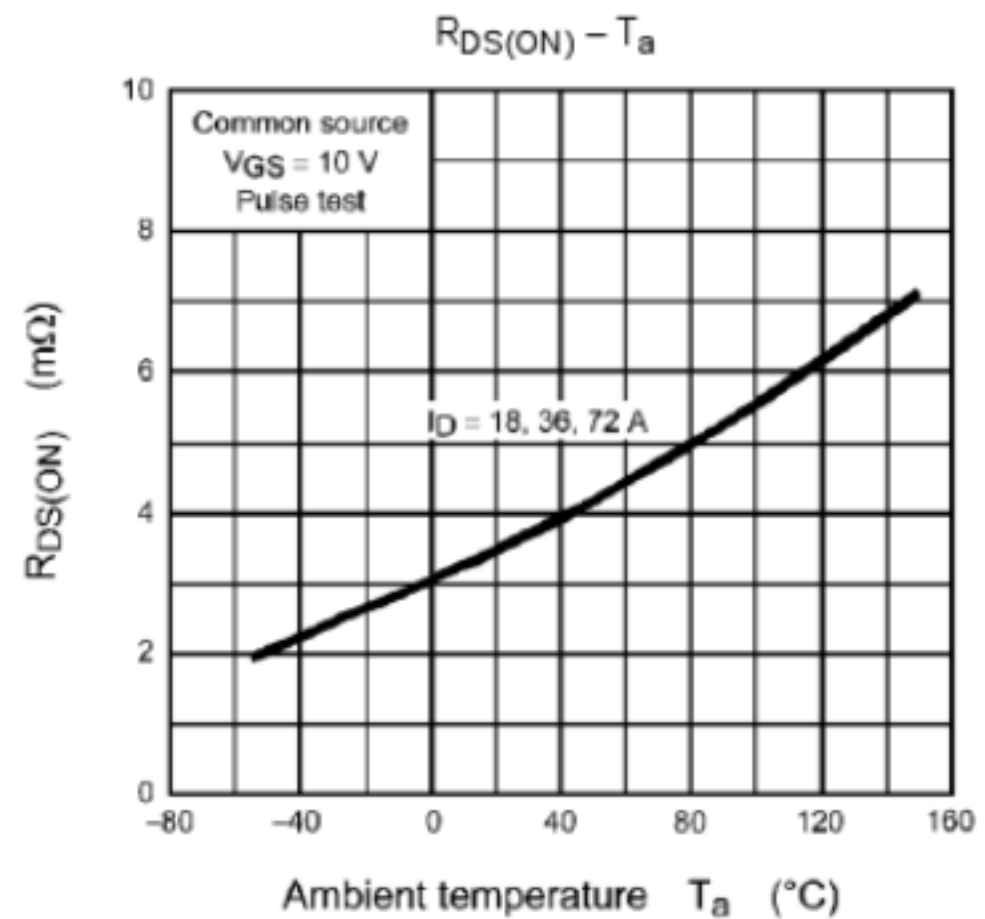
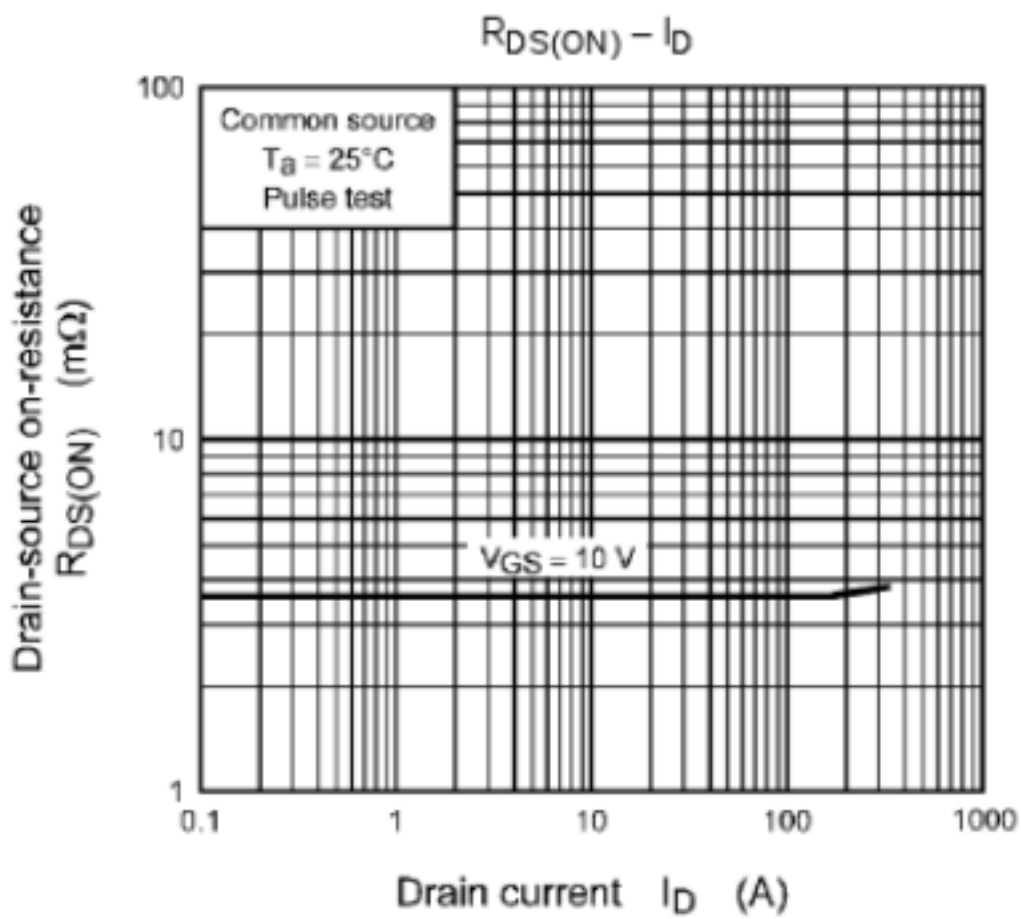
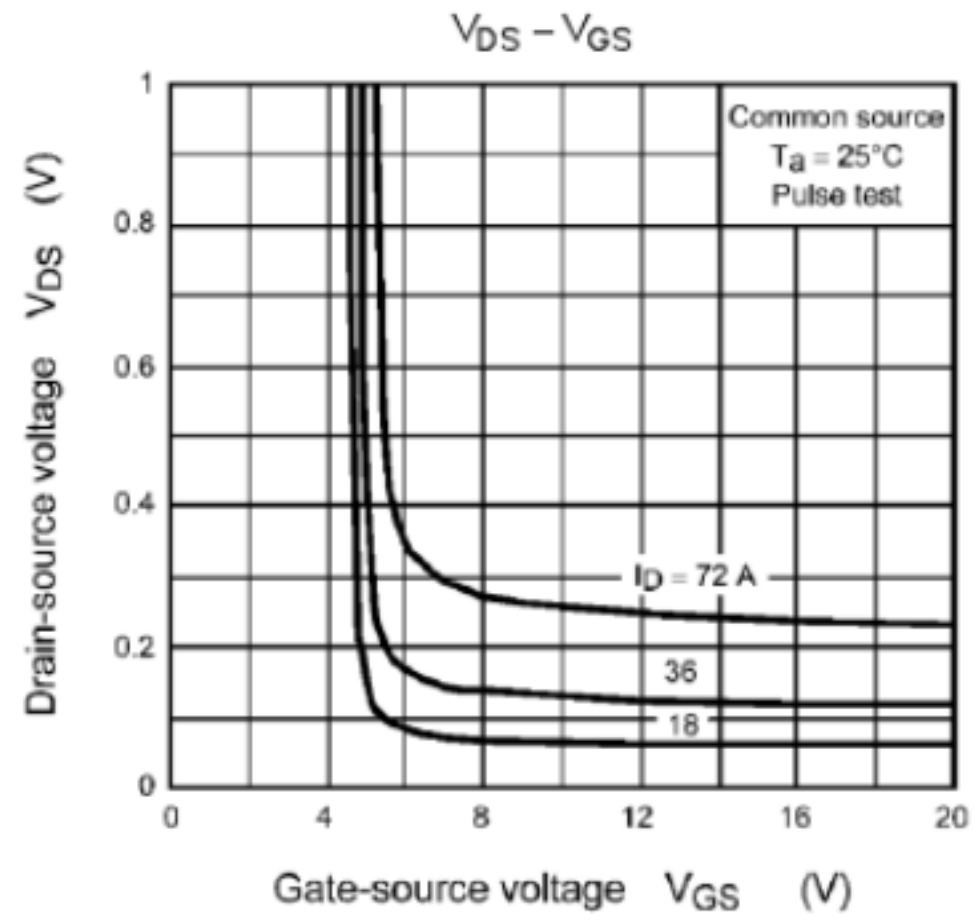
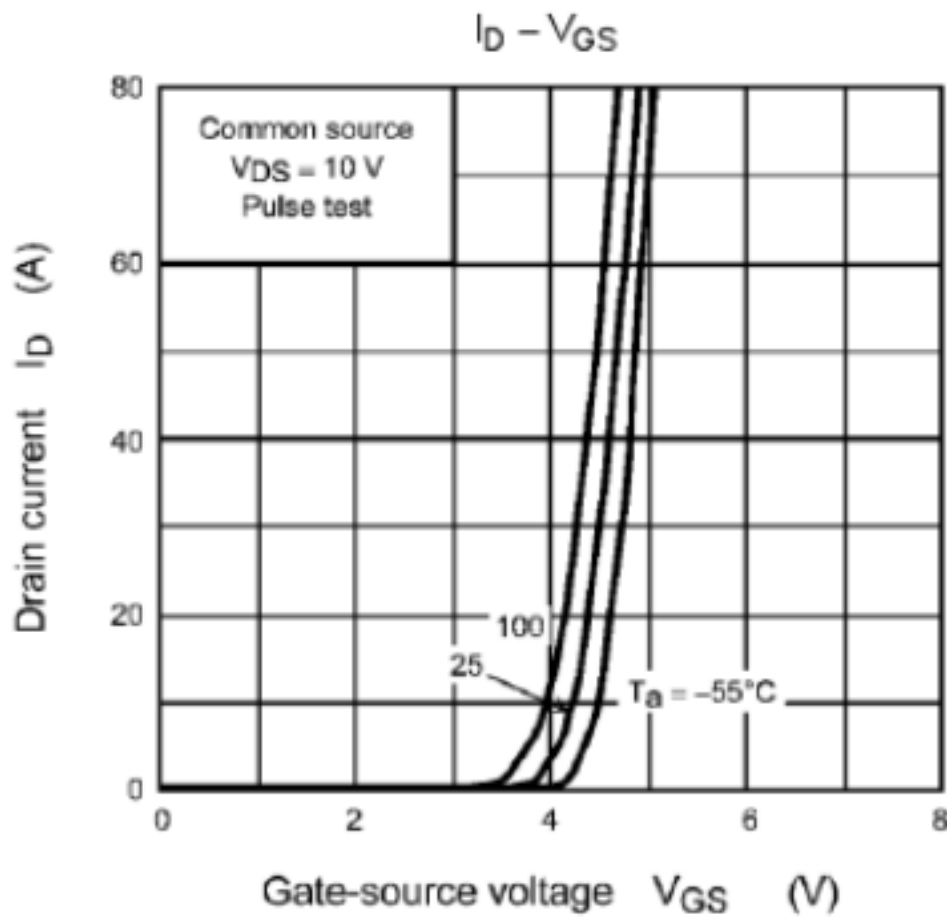
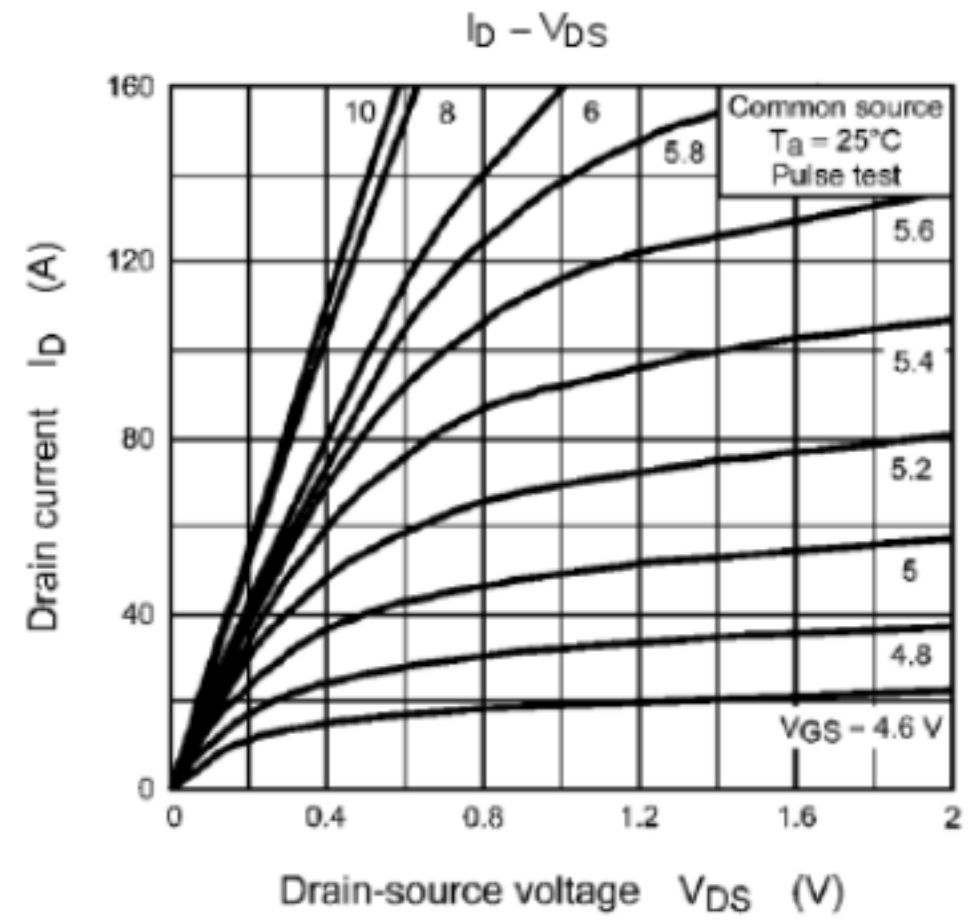
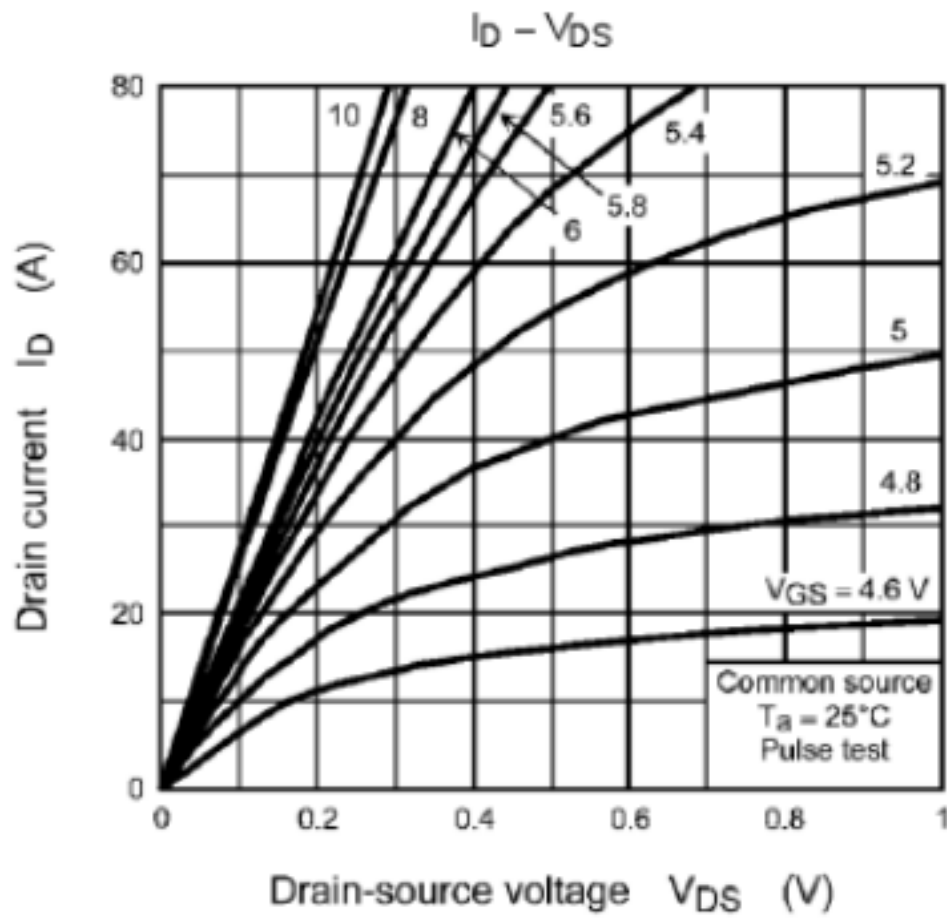
Characteristics		Symbol	Test Condition	Min	Typ.	Max	Unit
Gate leakage current		I_{GSS}	$V_{GS} = \pm 20\text{ V}, V_{DS} = 0\text{ V}$	—	—	± 0.1	μA
Drain cut-off current		I_{DSS}	$V_{DS} = 85\text{ V}, V_{GS} = 0\text{ V}$	—	—	10	
Drain-source breakdown voltage		$V_{(BR)DSS}$	$I_D = 10\text{ mA}, V_{GS} = 0\text{ V}$	85	—	—	V
Drain-source breakdown voltage		$V_{(BR)DSX}$	$I_D = 10\text{ mA}, V_{GS} = -20\text{ V}$	60	—	—	
Gate threshold voltage		V_{th}	$V_{DS} = 10\text{ V}, I_D = 1.0\text{ mA}$	2.5	—	4.5	
Drain-source ON resistance		$R_{DS(ON)}$	$V_{GS} = 10\text{ V}, I_D = 75\text{ A}$	—	3.65	5.0	$\text{m}\Omega$
Input capacitance		C_{iss}	$V_{DS} = 40\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$	—	5500	—	pF
Reverse transfer capacitance		C_{rss}		—	38	—	
Output capacitance		C_{oss}		—	1300	—	
Switching time	Rise time	t_r		—	19	—	ns
	Turn-on time	t_{on}		—	42	—	
	Fall time	t_f		—	28	—	
	Turn-off time	t_{off}		Duty $\leq 1\%$, $t_w = 10\ \mu\text{s}$	—	93	
Total gate charge (Gate-source plus gate-drain)		Q_g	$V_{DD} \approx 64\text{ V}, V_{GS} = 10\text{ V}, I_D = 72\text{ A}$	—	81	—	nC
Gate-source charge 1		Q_{gs1}		—	29	—	
Gate-drain charge		Q_{gd}		—	21	—	
Gate switch charge		Q_{SW}		—	33	—	

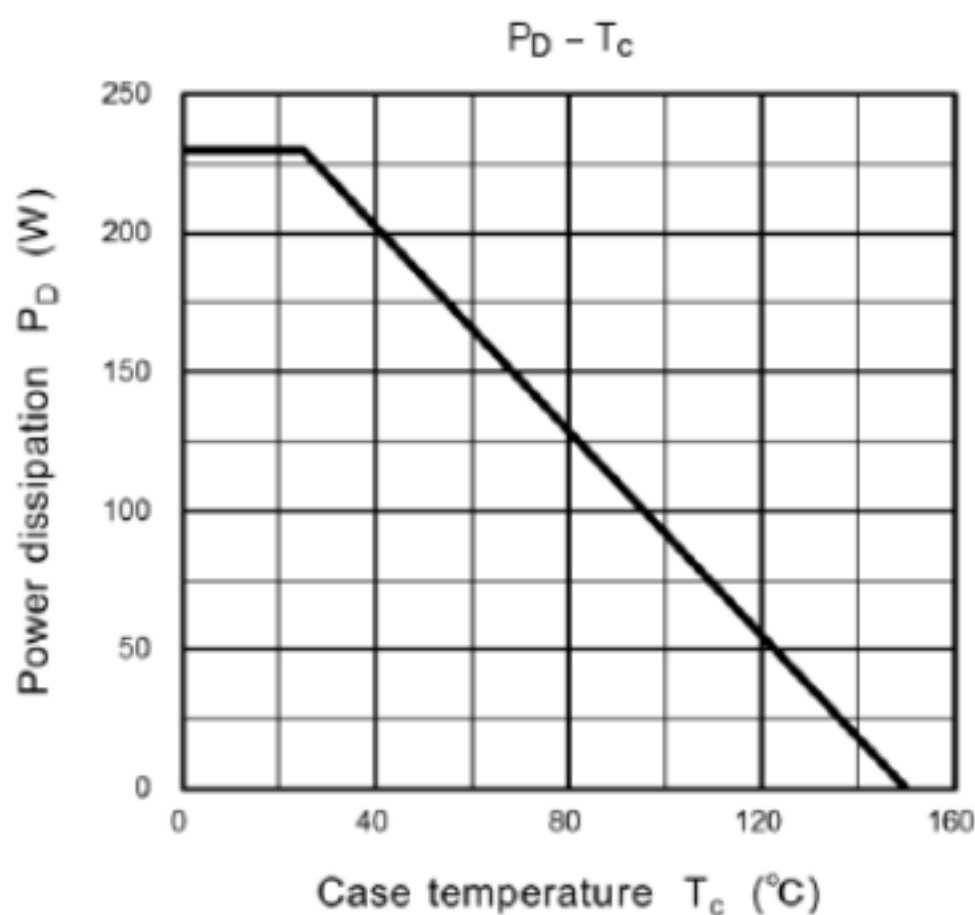
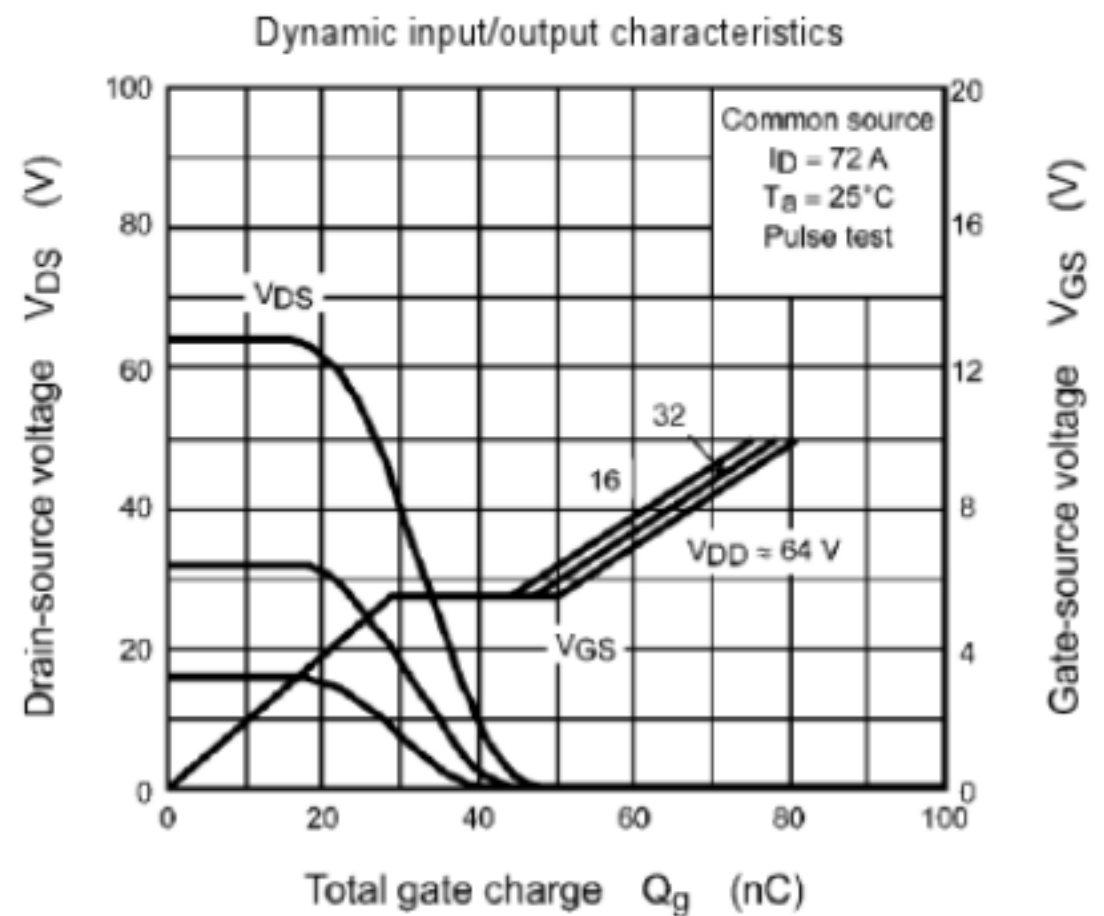
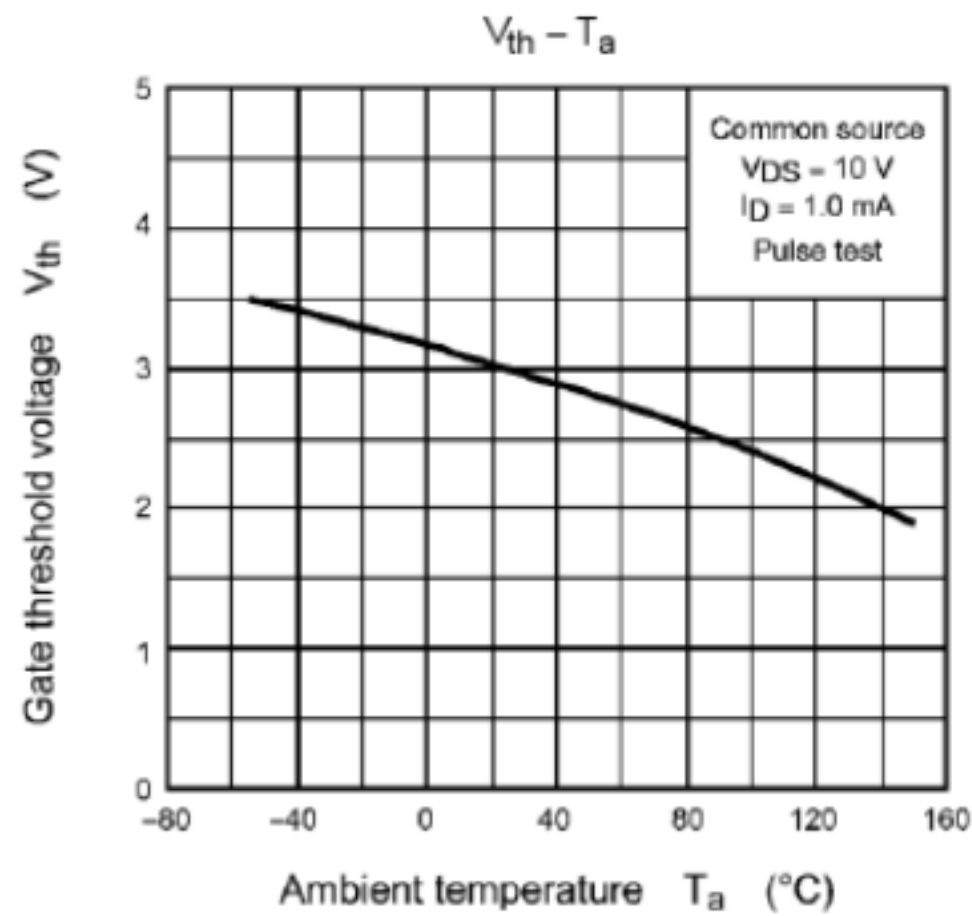
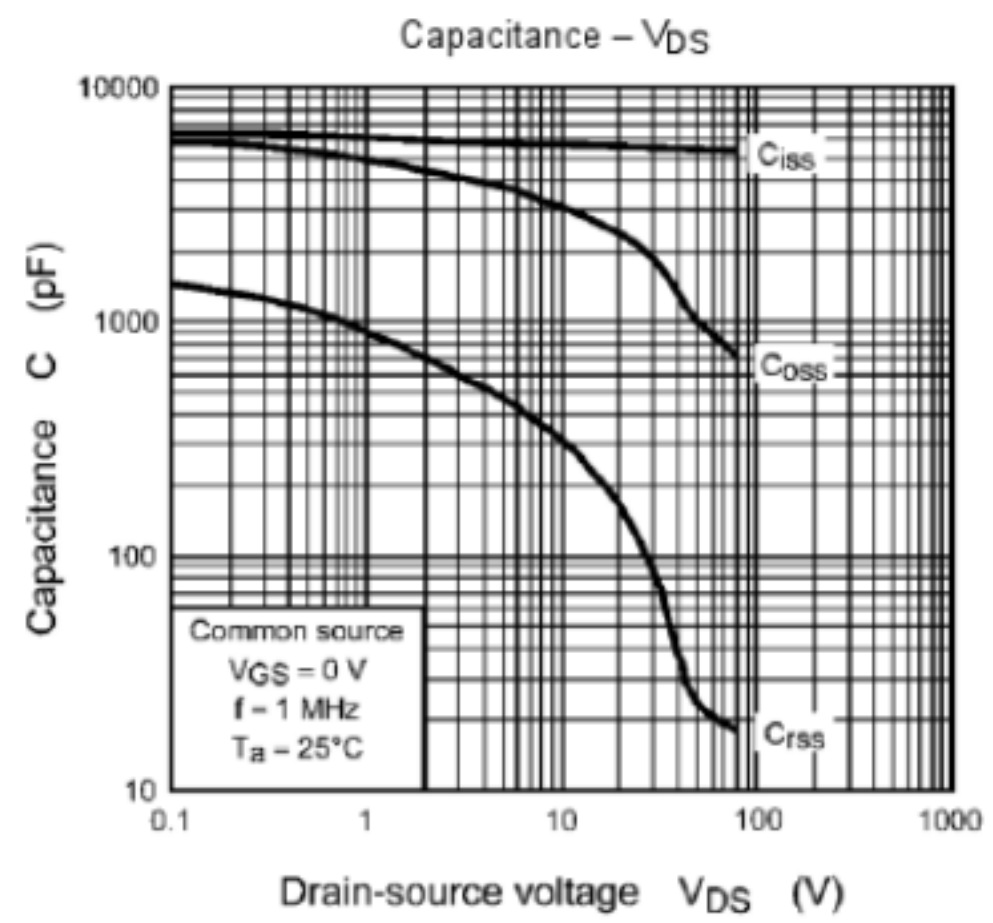
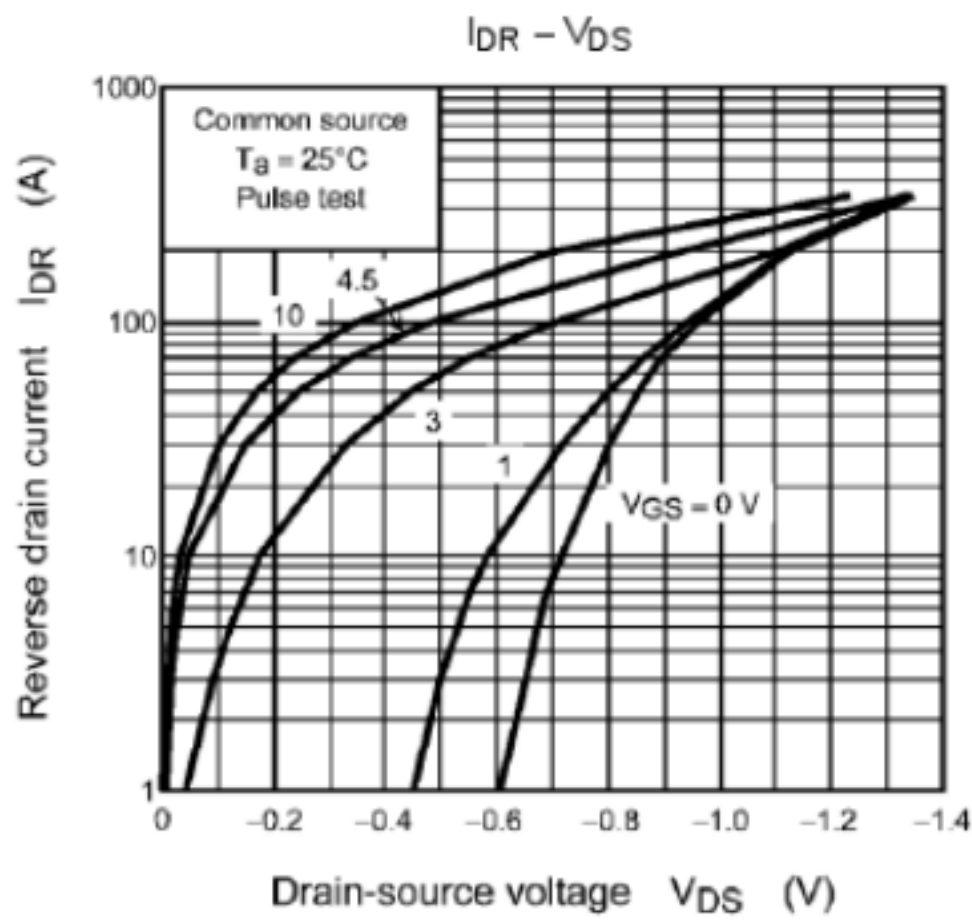
Source-Drain Ratings and Characteristics (Ta = 25°C)

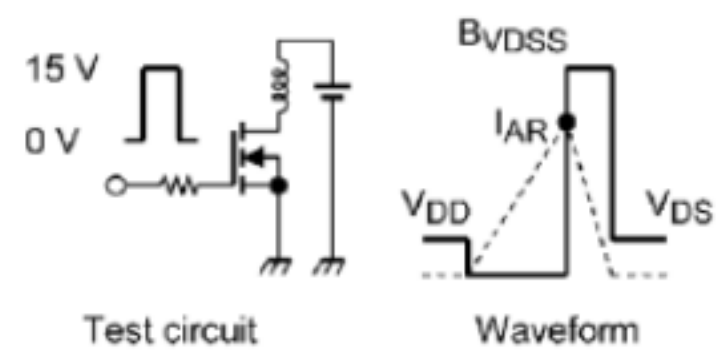
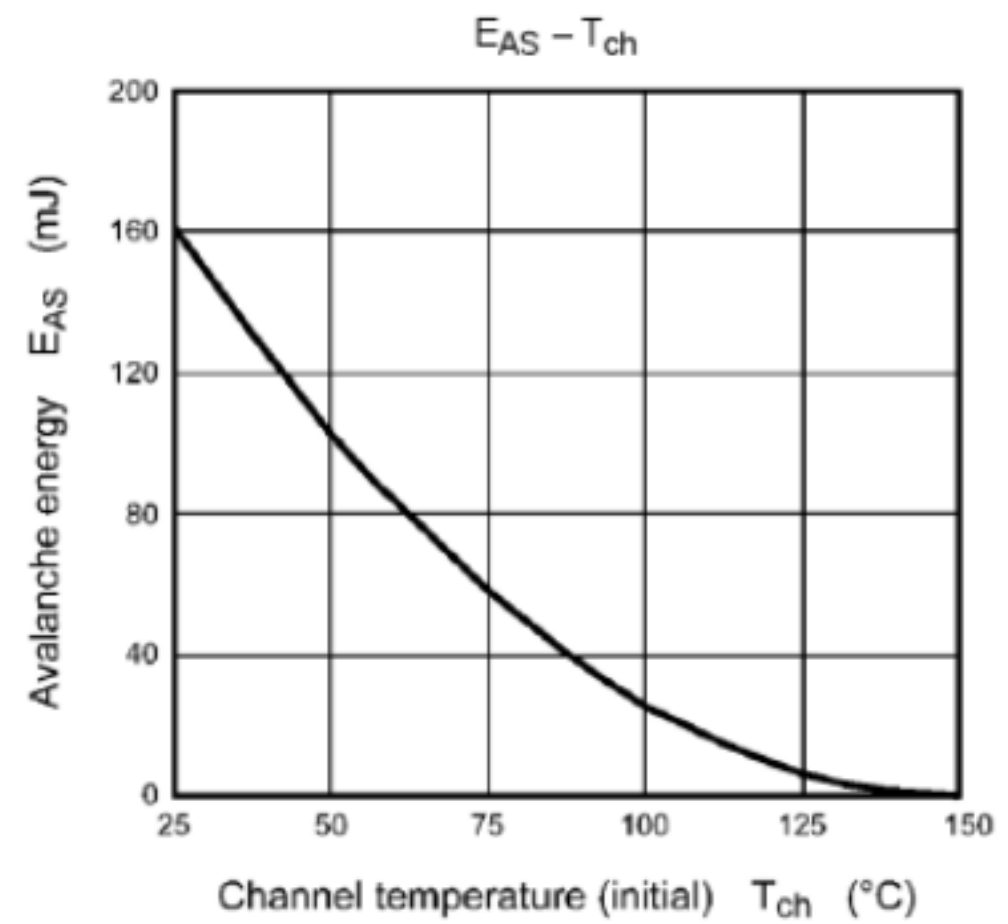
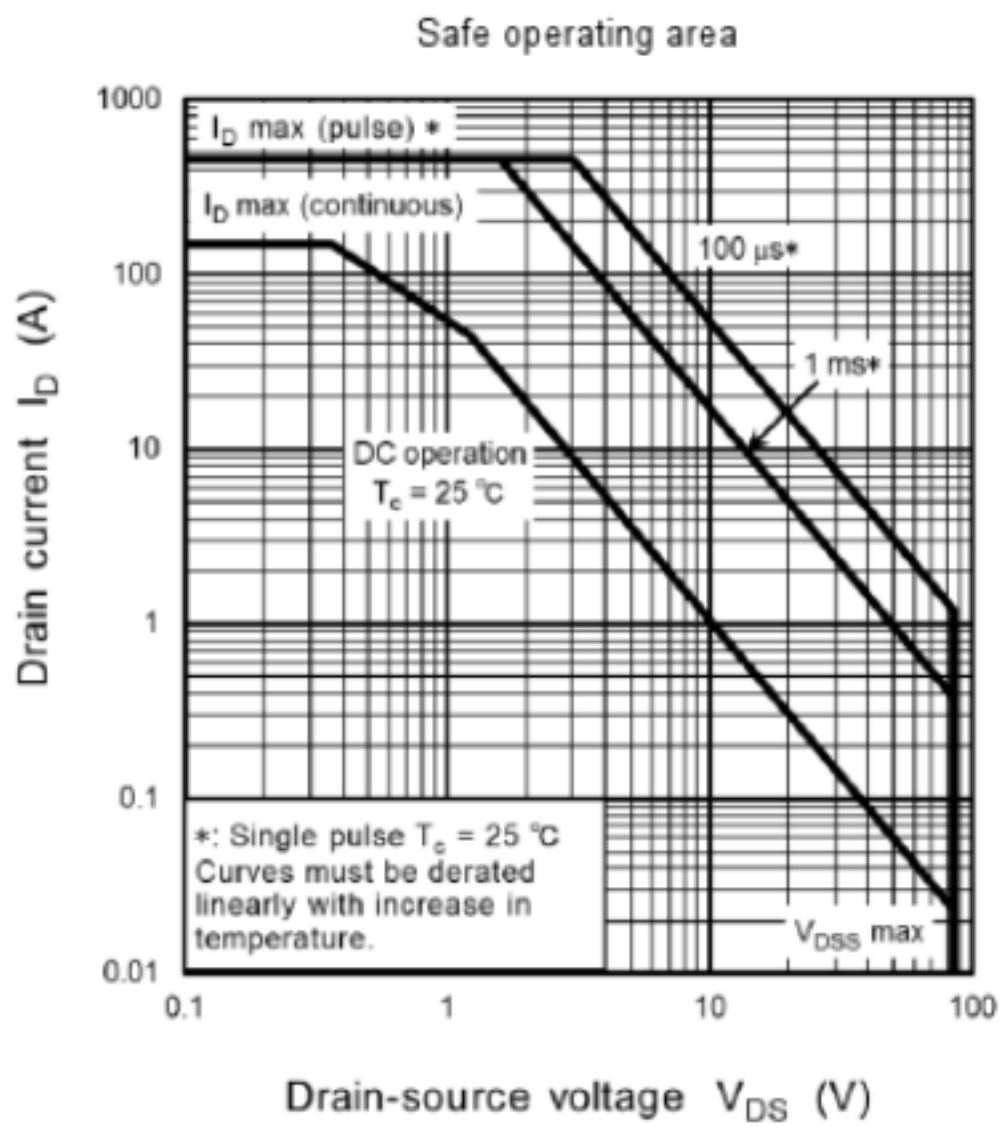
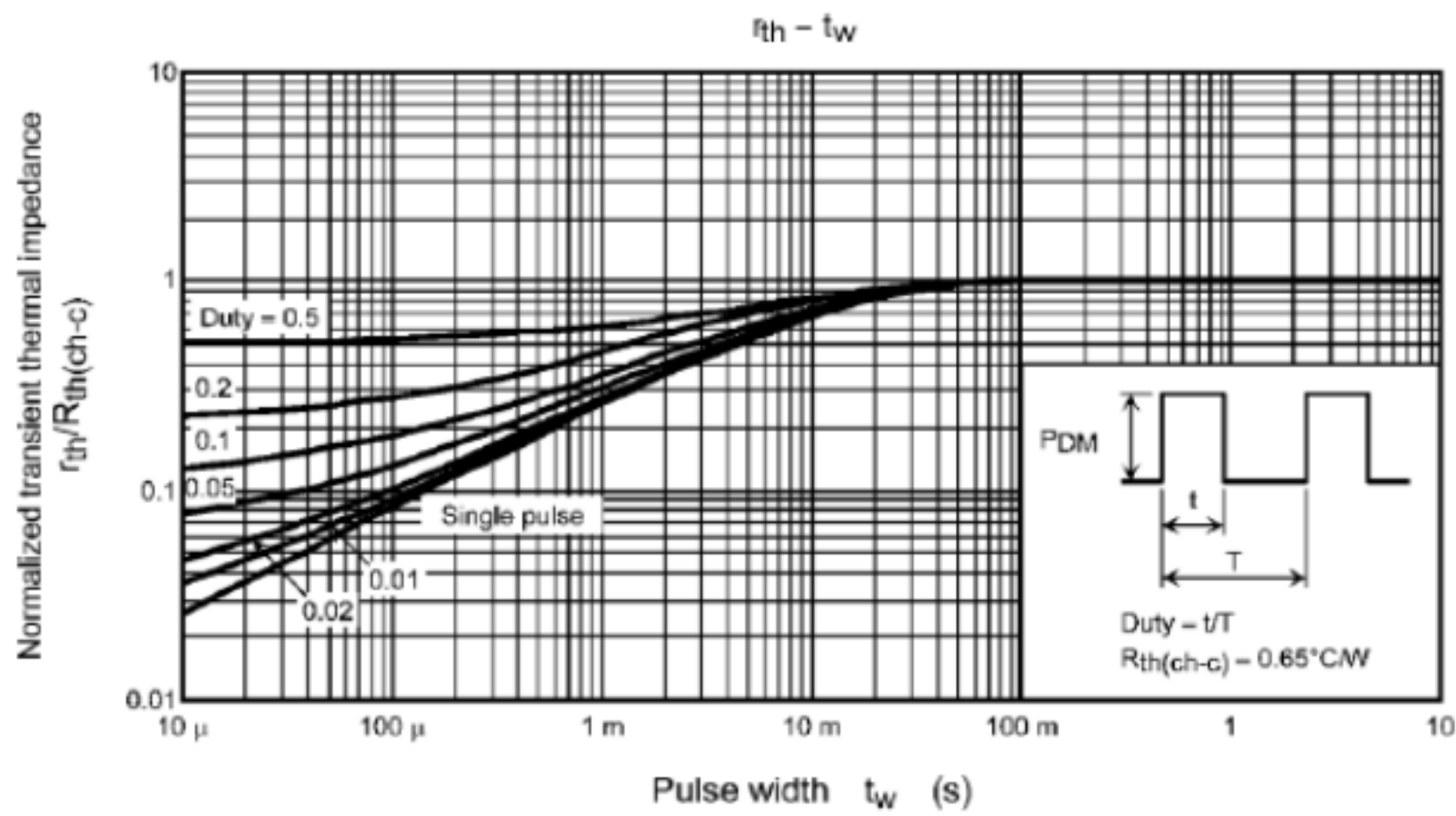
Characteristics	Symbol	Test Condition	Min	Typ.	Max	Unit
Continuous drain reverse current (Tc = 25°C) (Note 1)	I_{DR}	—	—	—	150	A
Pulse drain reverse current (Note 1)	I_{DRP}	—	—	—	450	A
Forward voltage (diode)	V_{DSF}	$I_{DR} = 150\text{ A}, V_{GS} = 0\text{ V}$	—	—	-1.3	V
Reverse recovery time	t_{rr}	$I_{DR} = 72\text{ A}, V_{GS} = 0\text{ V}$	—	77	—	ns
Reverse recovery charge	Q_{rr}	$-dI_{DR} / dt = 100\text{ A} / \mu\text{s}$	—	150	—	nC

Marking









$$V_{DD} = 64 \text{ V}, I_{AR} = 72 \text{ A} \quad E_{AS} = \frac{1}{2} \cdot L \cdot I_{AR}^2 \cdot \left(\frac{B_{VDSS}}{B_{VDSS} - V_{DD}} \right)$$

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