

Electrical Characteristics (Ta = 25°C)

Characteristic	Symbol	Test Conditions	Min	Typ.	Max	Unit	
Drain-Source breakdown voltage	$V_{(BR)DSS}$	$I_D = -1 \text{ mA}, V_{GS} = 0 \text{ V}$	-20	—	—	V	
	$V_{(BR)DSX}$	$I_D = -1 \text{ mA}, V_{GS} = 5 \text{ V}$ (Note 4)	-15	—	—		
Drain cut-off current	I_{DSS}	$V_{DS} = -20 \text{ V}, V_{GS} = 0 \text{ V}$	—	—	-1	μA	
Gate leakage current	I_{GSS}	$V_{GS} = \pm 8 \text{ V}, V_{DS} = 0 \text{ V}$	—	—	± 1	μA	
Gate threshold voltage	V_{th}	$V_{DS} = -3 \text{ V}, I_D = -1 \text{ mA}$	-0.3	—	-1.0	V	
Forward transfer admittance	$ Y_{fs} $	$V_{DS} = -3 \text{ V}, I_D = -1.0 \text{ A}$ (Note 3)	4.5	9.1	—	S	
Drain-source ON-resistance	$R_{DS(ON)}$	$I_D = -3.0 \text{ A}, V_{GS} = -4.5 \text{ V}$ (Note 3)	—	27.7	32.4	m Ω	
		$I_D = -2.5 \text{ A}, V_{GS} = -2.5 \text{ V}$ (Note 3)	—	33.1	41.7		
		$I_D = -1.5 \text{ A}, V_{GS} = -1.8 \text{ V}$ (Note 3)	—	40.6	57.9		
		$I_D = -0.5 \text{ A}, V_{GS} = -1.5 \text{ V}$ (Note 3)	—	48.6	89.6		
Input capacitance	C_{iss}	$V_{DS} = -10 \text{ V}, V_{GS} = 0 \text{ V}, f = 1 \text{ MHz}$	—	840	—	pF	
Output capacitance	C_{oss}		—	118	—		
Reverse transfer capacitance	C_{rss}		—	99	—		
Total Gate Charge	Q_g	$V_{DD} = -10 \text{ V}, I_D = -4.0 \text{ A}$ $V_{GS} = -4.5 \text{ V}$	—	12.8	—	nC	
Gate-Source Charge	Q_{gs1}		—	1.4	—		
Gate-Drain Charge	Q_{gd}		—	3.0	—		
Switching time	Turn-on time	t_{on}	$V_{DD} = -10 \text{ V}, I_D = -2.0 \text{ A},$ $V_{GS} = 0 \text{ to } -2.5 \text{ V}, R_G = 4.7 \Omega$	—	32	—	ns
	Turn-off time	t_{off}		—	107	—	
Drain-Source forward voltage	V_{DSF}	$I_D = 4.0 \text{ A}, V_{GS} = 0 \text{ V}$ (Note 3)	—	0.78	1.2	V	

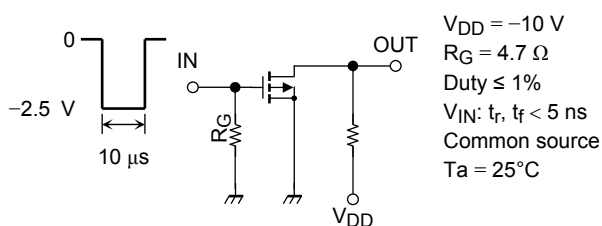
Note 3: Pulse test

Note 4: If a forward bias is applied between gate and source, this device enters $V_{(BR)DSX}$ mode.

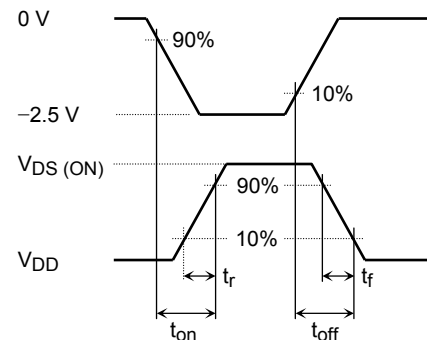
Note that the drain-source breakdown voltage is lowered in this mode

Switching Time Test Circuit

(a) Test circuit



(b) V_{IN}



(c) V_{OUT}

Precaution

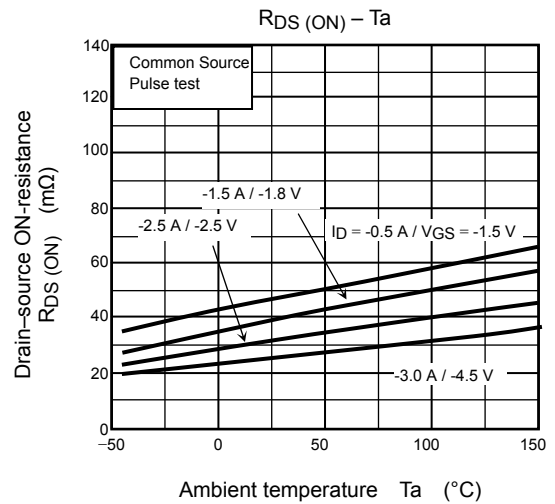
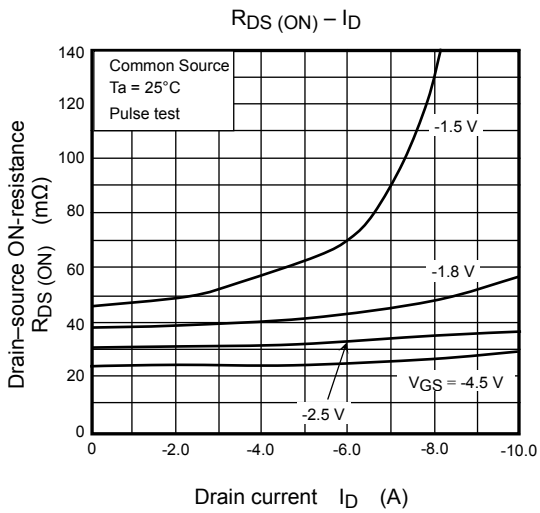
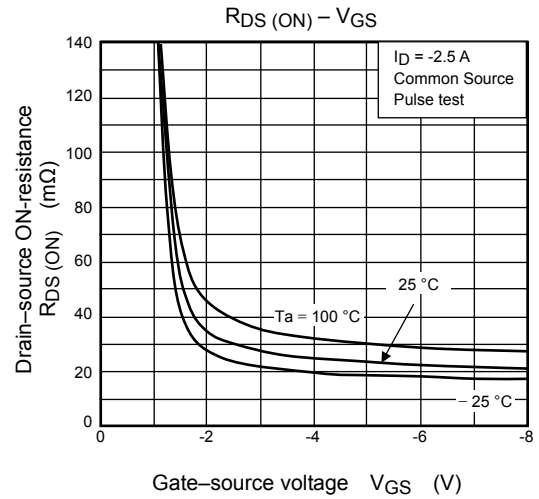
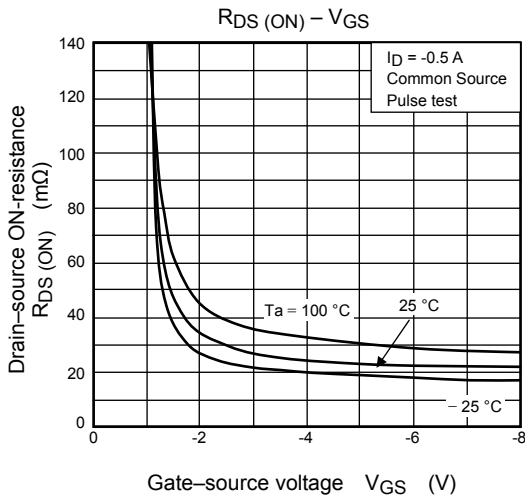
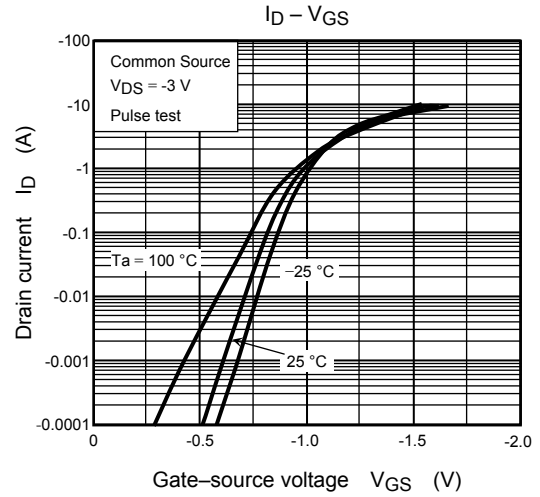
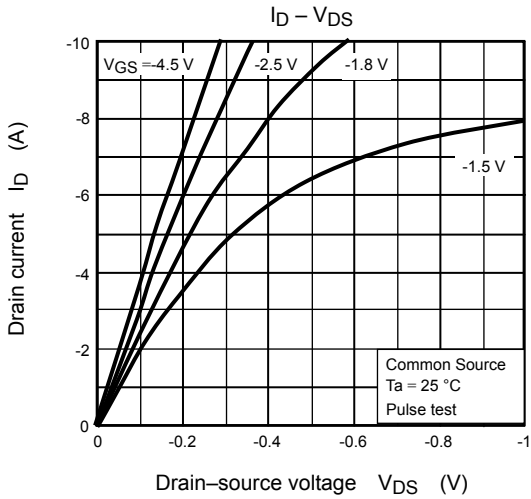
V_{th} can be expressed as voltage between gate and source when low operating current value is $I_D = -1 \text{ mA}$ for this product. For normal switching operation, $V_{GS(ON)}$ requires higher voltage than V_{th} and $V_{GS(OFF)}$ requires lower voltage than V_{th} . (Relationship can be established as follows: $V_{GS(OFF)} < V_{th} < V_{GS(ON)}$)

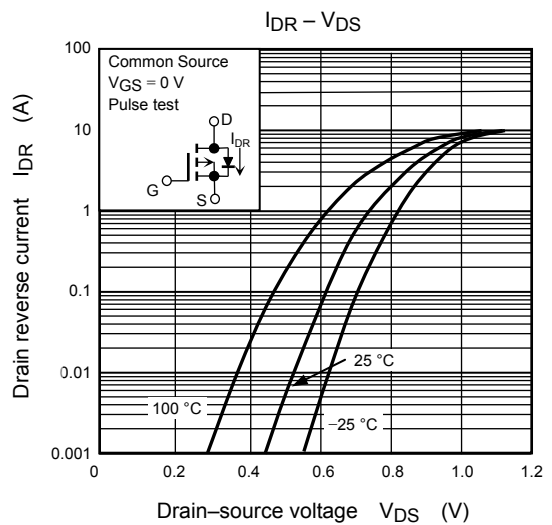
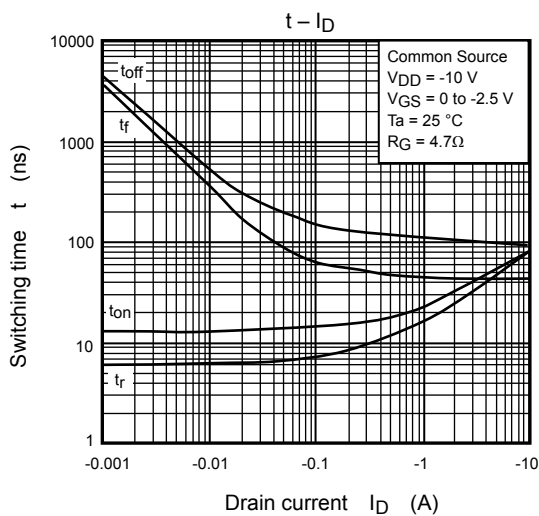
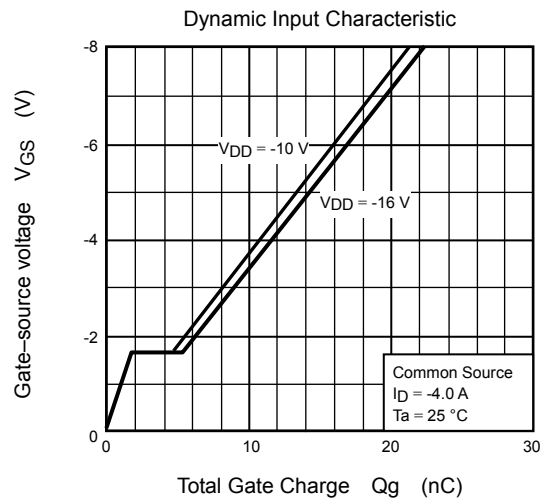
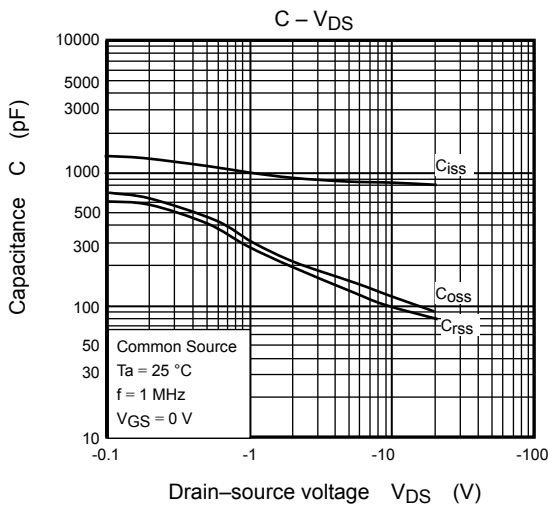
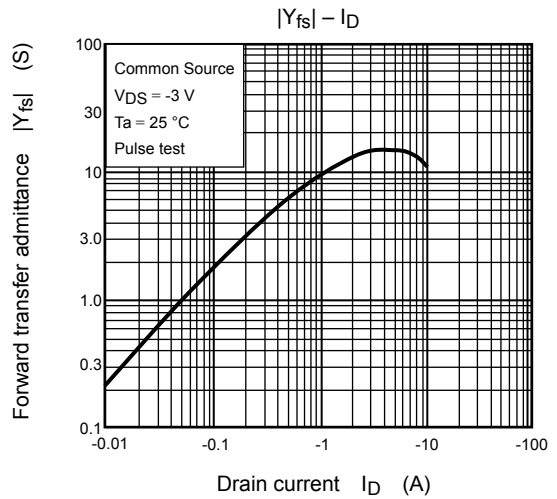
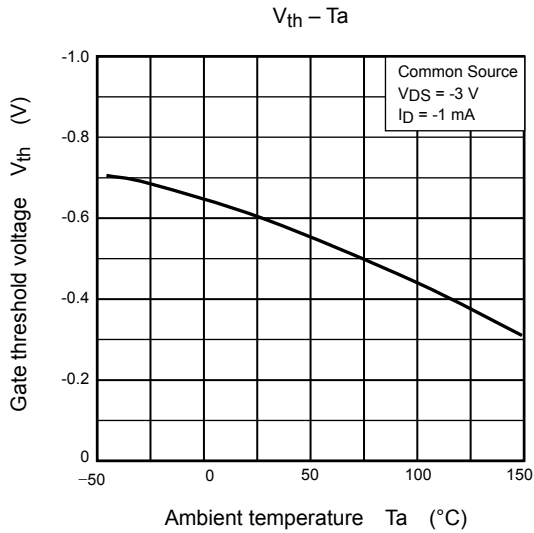
Please take this into consideration for using the device.

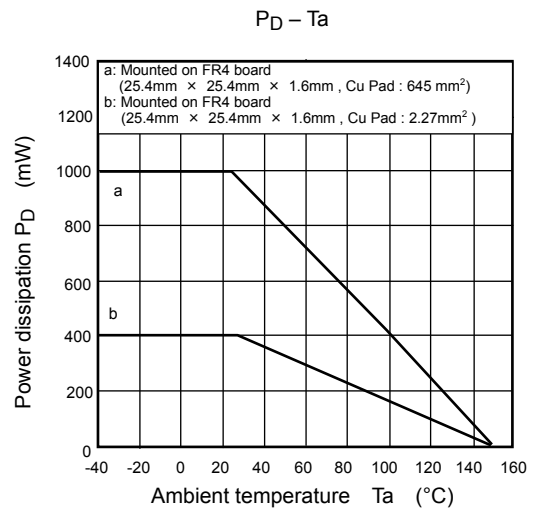
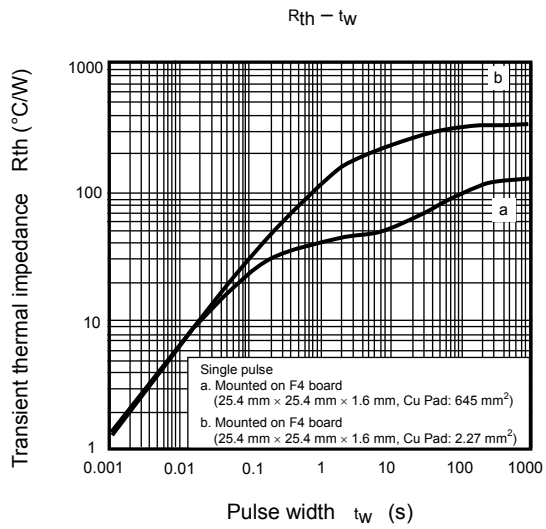
Handling Precaution

When handling individual devices that are not yet mounted on a circuit board, make sure that the environment is protected against electrostatic discharge. Operators should wear antistatic clothing, and containers and other objects that come into direct contact with devices should be made of antistatic materials.

Thermal resistance $R_{th(ch-a)}$ and power dissipation P_D vary depending on board material, board area, board thickness and pad area. When using this device, please take heat dissipation into consideration







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