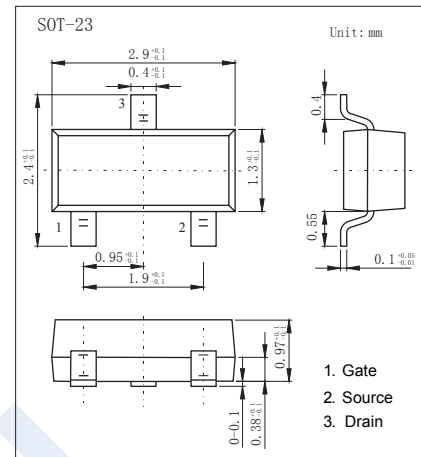
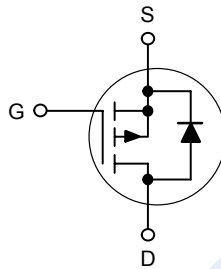


## P-Channel MOSFET

### NTR4101P (KTR4101P)

#### ■ Features

- $V_{DS}$  (V) = -20V
- $I_D$  = -3.2 A
- $R_{DS(ON)} < 85m\Omega$  ( $V_{GS} = -4.5V$ )
- $R_{DS(ON)} < 120m\Omega$  ( $V_{GS} = -2.5V$ )
- $R_{DS(ON)} < 210m\Omega$  ( $V_{GS} = -1.8V$ )



#### ■ Absolute Maximum Ratings $T_a = 25^\circ\text{C}$

Parameter	Symbol	Rating	Unit	
Drain-Source Voltage	$V_{DS}$	-20	V	
Gate-Source Voltage	$V_{GS}$	$\pm 8$		
Continuous Drain Current @Steady State (Note.1)	$I_D$	$T_a = 25^\circ\text{C}$	-2.4	A
		$T_a = 85^\circ\text{C}$	-1.7	
Continuous Drain Current @ $t \leq 10s$ (Note.1)		$T_a = 25^\circ\text{C}$	-3.2	
Power Dissipation (Note.1)	$P_D$	Steady State	0.73	W
		$t \leq 10s$	1.25	
Continuous Drain Current (Note.2)	$I_D$	$T_a = 25^\circ\text{C}$	-1.8	A
		$T_a = 85^\circ\text{C}$	-1.3	
Power Dissipation (Note.2)	$P_D$	0.42	W	
Pulsed Drain Current	$I_{DM}$	$t_p = 10\mu s$	-7.5	A
ESD Capability (Note 3)	ESD	$C = 100\text{ pF}$ $R_s = 1500\Omega$	225	V
Thermal Resistance.Junction- to-Ambient (Note.1)	$R_{thJA}$	Steady State	170	$^\circ\text{C/W}$
		$t \leq 10s$	100	
Thermal Resistance.Junction- to-Ambient (Note.2)		Steady State	300	
Junction Temperature	$T_J$	150	$^\circ\text{C}$	
Junction Storage Temperature Range	$T_{stg}$	-55 to 150		

Note.1:Surface-mounted on FR4 board using 1 in sq pad size

Note.2:Surface-mounted on FR4 board using the minimum recommended pad size

Note.3:ESD Rating Information: HBM Class 0

## P-Channel MOSFET

### NTR4101P (KTR4101P)

#### ■ Electrical Characteristics Ta = 25°C

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Drain-Source Breakdown Voltage	V <sub>DSS</sub>	I <sub>D</sub> =-250 μA, V <sub>GS</sub> =0V	-20			V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =-16V, V <sub>GS</sub> =0V			-1	μA
Gate-Body leakage current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±8V			±100	nA
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =-250 μA	-0.4		-1.5	V
Static Drain-Source On-Resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-1.6A			85	mΩ
		V <sub>GS</sub> =-2.5V, I <sub>D</sub> =-1.3A			120	
		V <sub>GS</sub> =-1.8V, I <sub>D</sub> =-0.9A			210	
Forward Transconductance	g <sub>FS</sub>	V <sub>DS</sub> =-5V, I <sub>D</sub> =-2.3A	3			S
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-10V, f=1MHz		675		pF
Output Capacitance	C <sub>oss</sub>			100		
Reverse Transfer Capacitance	C <sub>rss</sub>			75		
Gate resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, f=1MHz		6.5		Ω
Total Gate Charge	Q <sub>g</sub>	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-10V, I <sub>D</sub> =-1.6A		7.5	8.5	nC
Gate Source Charge	Q <sub>gs</sub>			1.2		
Gate Drain Charge	Q <sub>gd</sub>			2.2		
Turn-On DelayTime	t <sub>d(on)</sub>	V <sub>GS</sub> =-4.5V, V <sub>DS</sub> =-10V, I <sub>D</sub> =-1.6A, R <sub>G</sub> =6Ω		7.5		ns
Turn-On Rise Time	t <sub>r</sub>			12.6		
Turn-Off DelayTime	t <sub>d(off)</sub>			30.2		
Turn-Off Fall Time	t <sub>f</sub>			21		
Turn-On Delay Time	t <sub>rr</sub>			12.8	15	
Reverse Recovery Time	t <sub>a</sub>	I <sub>F</sub> =-1.6A, di/dt=100A/us, V <sub>GS</sub> =0		9.9		ns
Discharge Time	t <sub>b</sub>			3		
Reverse Recovery Charge	Q <sub>rr</sub>			1008		nC
Maximum Body-Diode Continuous Current	I <sub>S</sub>				-2.4	A
Diode Forward Voltage	V <sub>SD</sub>	I <sub>S</sub> =-2.4A, V <sub>GS</sub> =0V			-1.2	V

Note.Pulse Test: Pulse Width ≤ 300us, Duty Cycle ≤ 2%.

#### ■ Marking

Marking	TR4
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## P-Channel MOSFET NTR4101P (KTR4101P)

■ Typical Characteristics

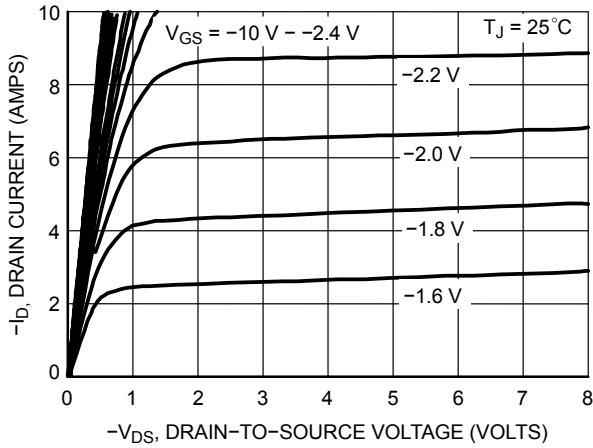


Figure 1. On-Region Characteristics

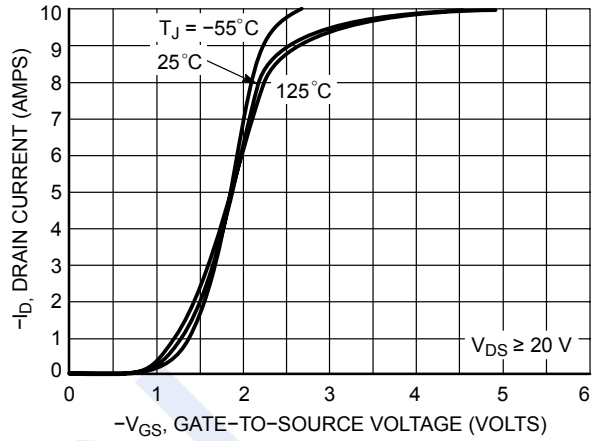


Figure 2. Transfer Characteristics

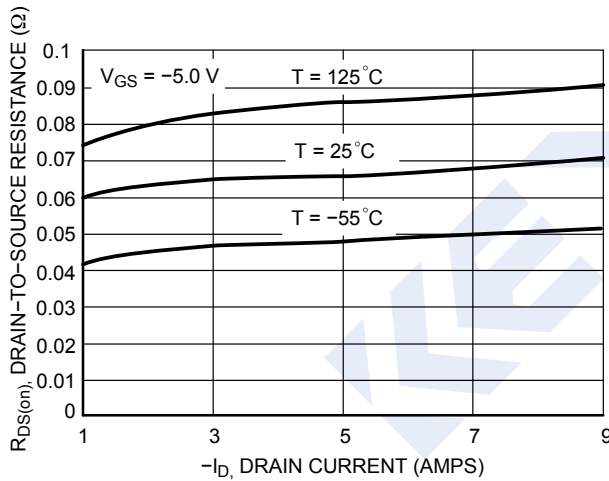


Figure 3. On-Resistance vs. Drain Current and Temperature

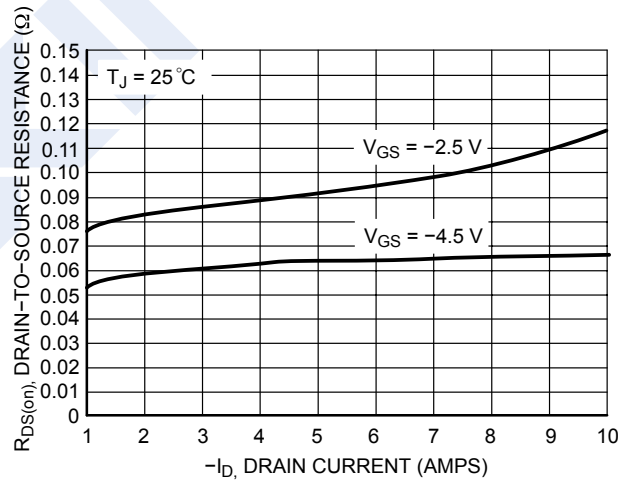


Figure 4. On-Resistance vs. Drain Current and Temperature

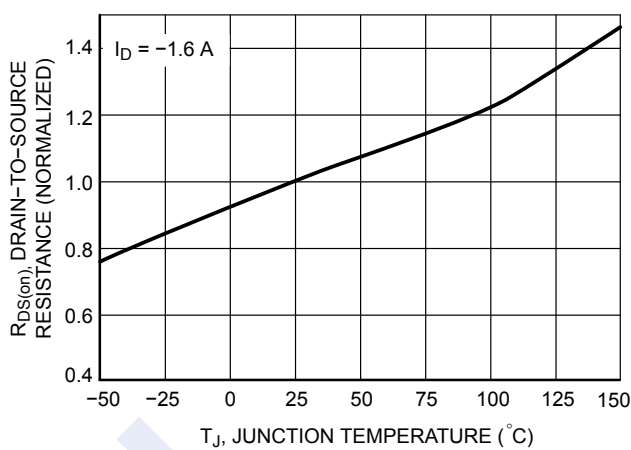


Figure 5. On-Resistance Variation with Temperature

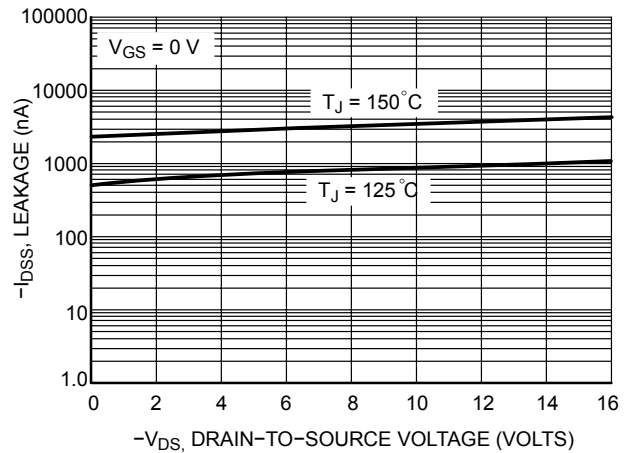


Figure 6. Drain-to-Source Leakage Current vs. Voltage

## P-Channel MOSFET NTR4101P (KTR4101P)

■ Typical Characteristics

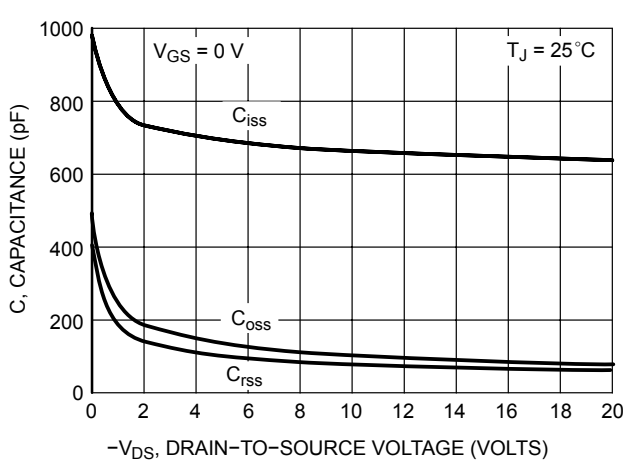


Figure 7. Capacitance Variation

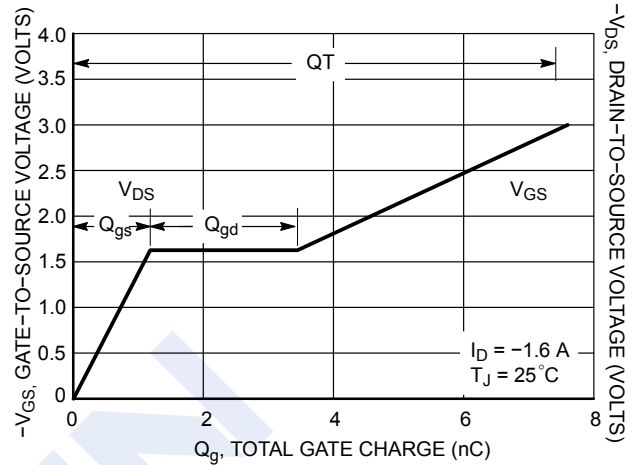


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Gate Charge

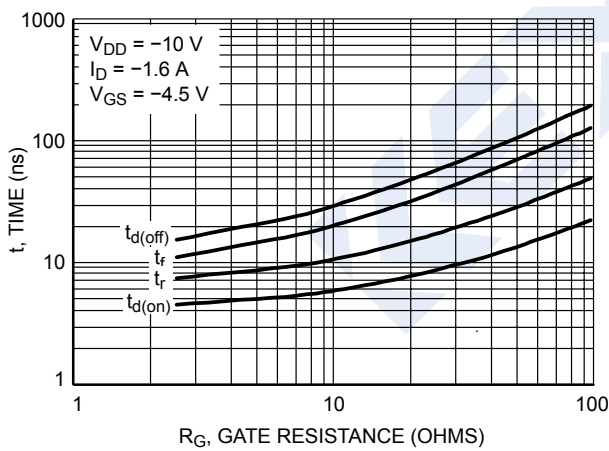


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

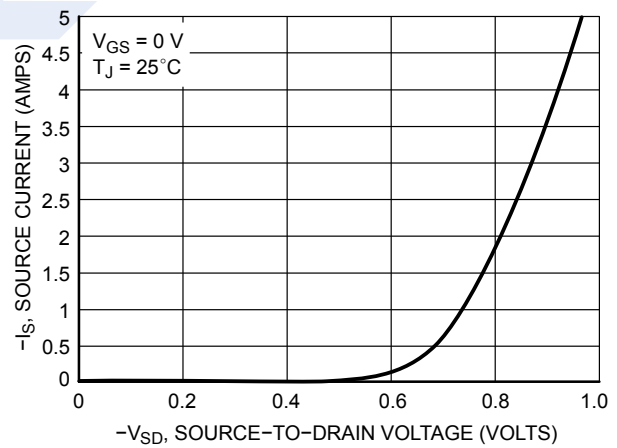


Figure 10. Diode Forward Voltage vs. Current