



# N-Channel 20-V (D-S) MOSFETs

PRODUCT SUMMARY		
$V_{DS}$ (V)	$r_{DS(on)}$ ( $\Omega$ )	$I_D$ (A)
20	0.4 at $V_{GS} = 4.5$ V	0.73
	0.5 at $V_{GS} = 2.5$ V	0.65

## FEATURES

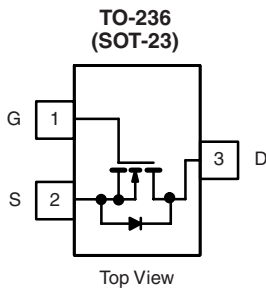
- TrenchFET<sup>®</sup> Power MOSFET
- ESD Protected: 4000 V



RoHS  
COMPLIANT

## APPLICATIONS

- Direct Logic-Level Interface: TTL/CMOS
- Drivers: Relays, Solenoids, Lamps, Hammers
- Battery Operated Systems, DC/DC Converters
- Solid-State Relays
- Load/Power Switching-Cell Phones, Pagers



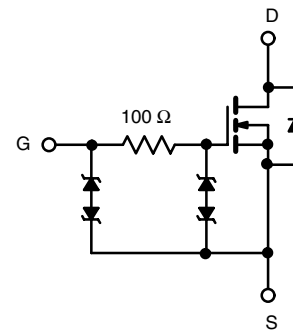
Marking Code: K2ywl

K2 = Part Number Code for TN0200K

y = Year Code

w = Week Code

l = Lot Traceability



Ordering Information: TN0200K-T1-E3 (Lead (Pb)-free)

ABSOLUTE MAXIMUM RATINGS $T_A = 25$ °C, unless otherwise noted				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	$V_{DS}$	20	V	
Gate-Source Voltage	$V_{GS}$	$\pm 8$		
Continuous Drain Current ( $T_J = 150$ °C) <sup>b</sup>	$I_D$	$T_A = 25$ °C	0.73	A
		$T_A = 70$ °C	0.58	
Pulsed Drain Current <sup>a</sup>	$I_{DM}$	4		
Continuous Source Current (Diode Conduction) <sup>b</sup>	$I_S$	0.3		
Power Dissipation <sup>b</sup>	$P_D$	$T_A = 25$ °C	0.35	W
		$T_A = 70$ °C	0.22	
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Limit	Unit
Maximum Junction-to-Ambient <sup>b</sup>	$R_{thJA}$	357	°C/W

Notes:

a. Pulse width limited by maximum junction temperature.

b. Surface Mounted on FR4 Board,  $t \leq 10$  sec.



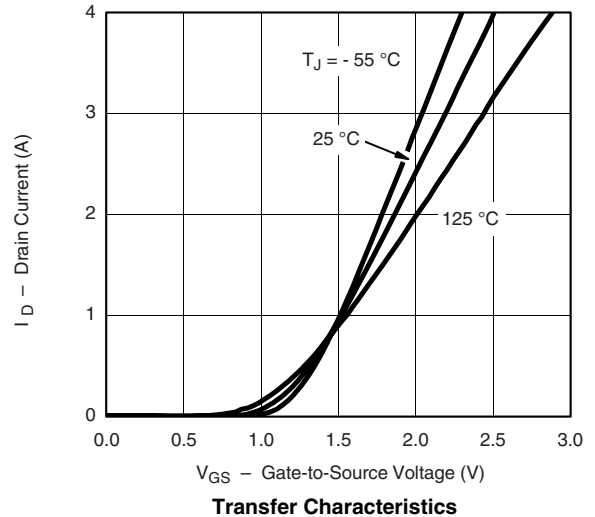
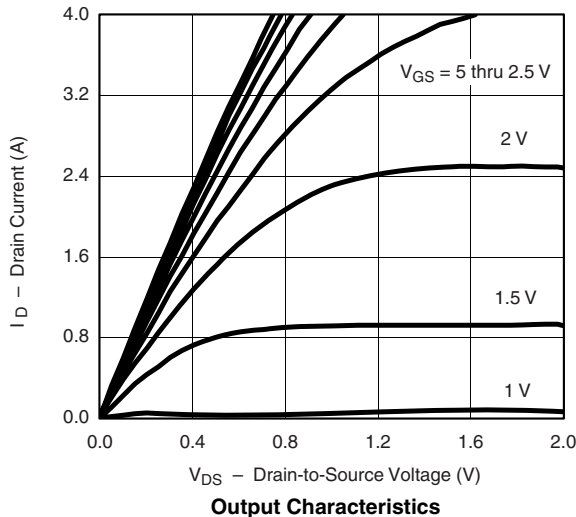
SPECIFICATIONS $T_A = 25\text{ }^\circ\text{C}$ , unless otherwise noted						
Parameter	Symbol	Test Conditions	Limits			Unit
			Min	Typ	Max	
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 10\text{ }\mu\text{A}$	20			V
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 50\text{ }\mu\text{A}$	0.45	0.6	1.0	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 4.5\text{ V}$			$\pm 5$	$\mu\text{A}$
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 20\text{ V}, V_{GS} = 0\text{ V}$			0.1	$\mu\text{A}$
		$T_J = 55\text{ }^\circ\text{C}$			10	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 5\text{ V}, V_{GS} = 4.5\text{ V}$	2.5			A
		$V_{DS} \geq 5\text{ V}, V_{GS} = 2.5\text{ V}$	1.5			
Drain-Source On-Resistance <sup>a</sup>	$r_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 0.6\text{ A}$		0.2	0.4	$\Omega$
		$V_{GS} = 2.5\text{ V}, I_D = 0.6\text{ A}$		0.25	0.5	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 5\text{ V}, I_D = 0.6\text{ A}$		2.2		S
Diode Forward Voltage <sup>a</sup>	$V_{SD}$	$I_S = 0.3\text{ A}, V_{GS} = 0\text{ V}$		0.8	1.2	V
<b>Dynamic<sup>b</sup></b>						
Total Gate Charge	$Q_g$	$V_{DS} = 10\text{ V}, V_{GS} = 4.5\text{ V}$ $I_D = 0.6\text{ A}$		1400	2000	$\mu\text{C}$
Gate-Source Charge	$Q_{gs}$			190		
Gate-Drain Charge	$Q_{gd}$			300		
Gate Resistance	$R_g$		105			$\Omega$
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 10\text{ V}, R_L = 16\text{ }\Omega$ $I_D \cong 0.6\text{ A}, V_{GEN} = 4.5\text{ V}$ $R_g = 6\text{ }\Omega$		17	25	ns
Rise Time	$t_r$			20	30	
Turn-Off Delay Time	$t_{d(off)}$			55	85	
Fall Time	$t_f$			30	45	

Notes:

- a. Pulse test:  $PW \leq 300\text{ }\mu\text{s}$  duty cycle  $\leq 2\%$ .
- b. Guaranteed by design, not subject to production testing.

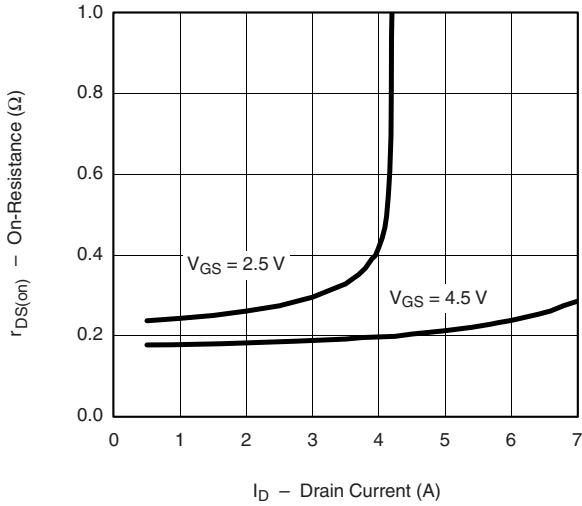
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**TYPICAL CHARACTERISTICS**  $25\text{ }^\circ\text{C}$ , unless otherwise noted

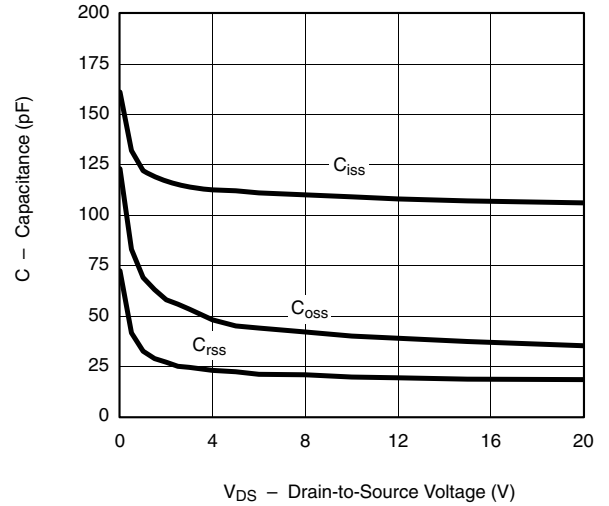




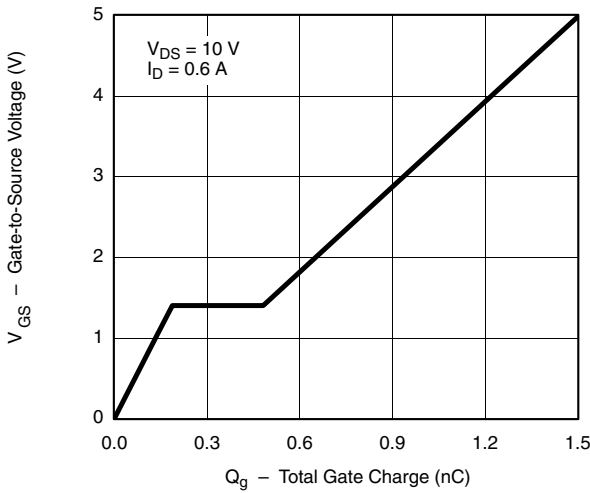
**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



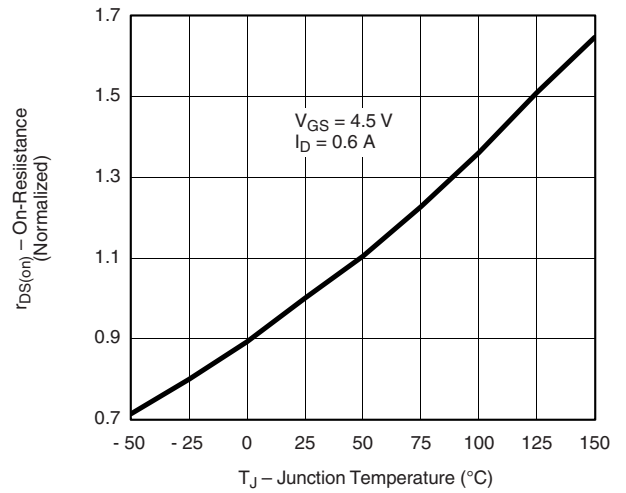
**On-Resistance vs. Drain Current**



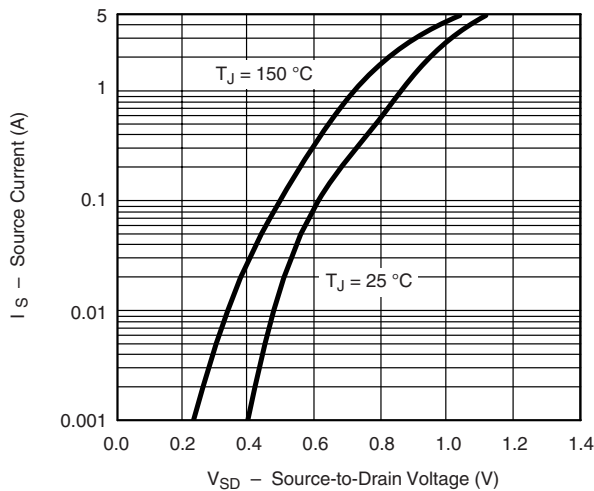
**Capacitance**



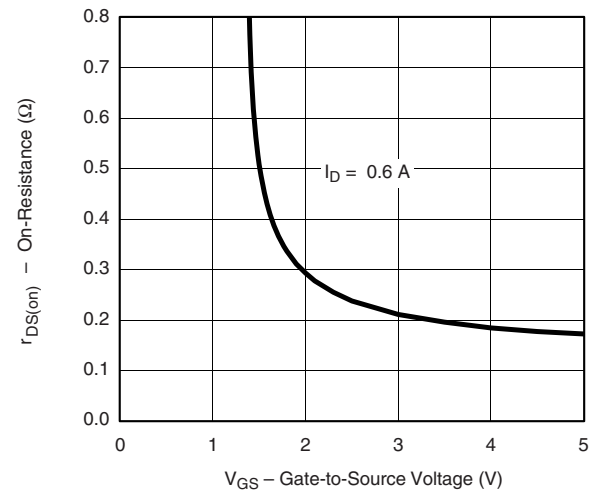
**Gate Charge**



**On-Resistance vs. Junction Temperature**



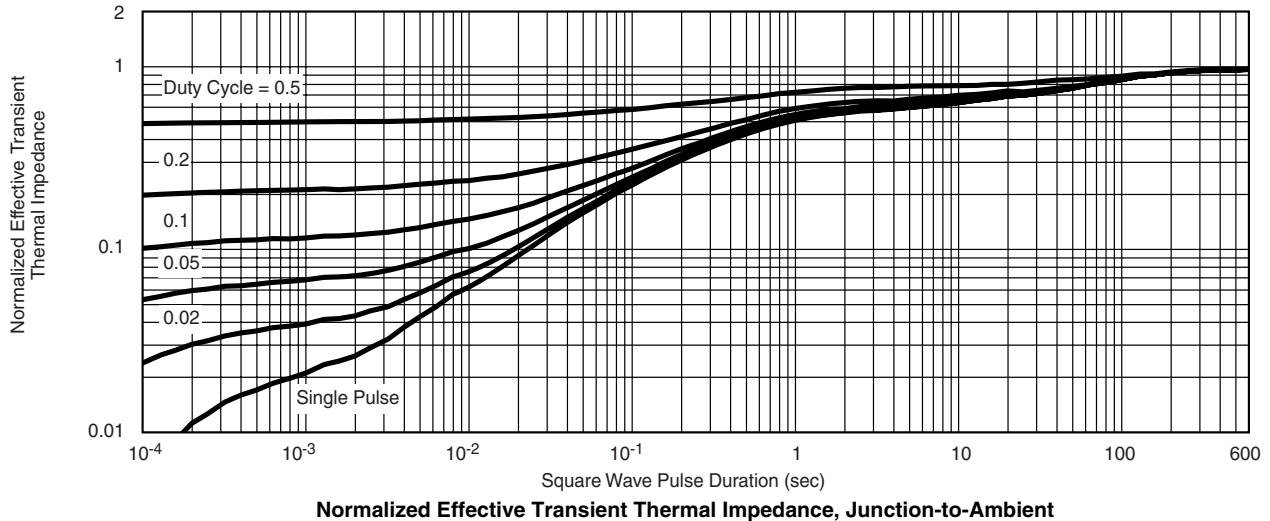
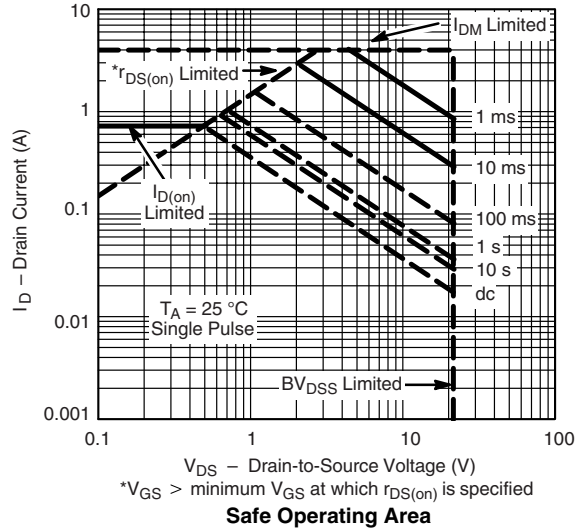
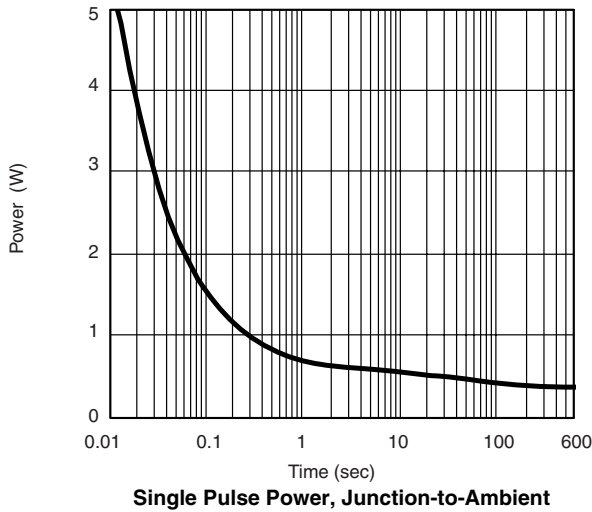
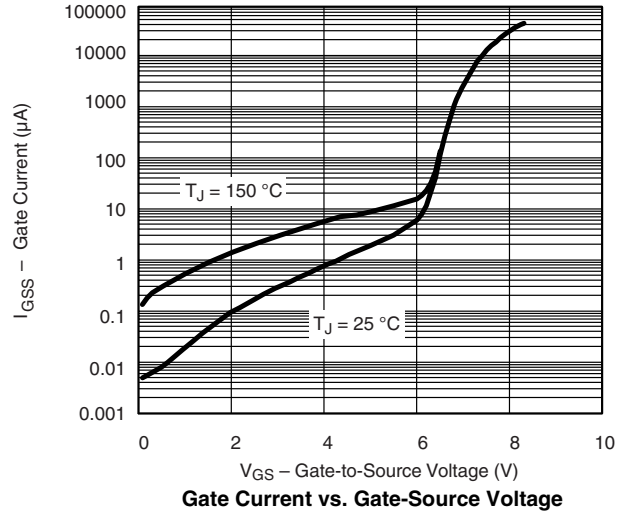
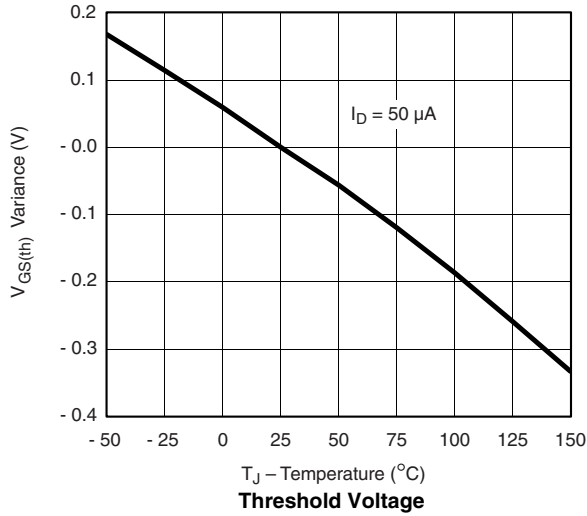
**Source-Drain Diode Forward Voltage**



**On-Resistance vs. Gate-Source Voltage**



**TYPICAL CHARACTERISTICS** 25 °C, unless otherwise noted



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