

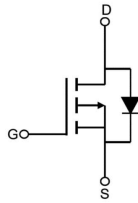
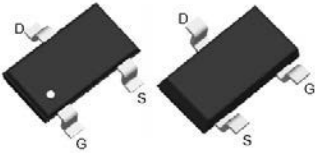


## General Description

The ZT20P07 is the high cell density trenched P-channel MOSFET, which provides excellent  $R_{DS(on)}$  and efficiency for most of the small power switching and load switch applications.

The ZT20P07 meet the RoHS and Green Product requirement with full function reliability approved.

## SOT-23 Pin Configuration



## Product Summary

$V_{DS}$ (V)	$R_{DS(on)}$ (m $\Omega$ )	$I_D$ (A)
-20	21 at $V_{GS} = 4.5$ V	-6.2
	30 at $V_{GS} = 2.5$ V	-5.3

## Features

- High power and current handling capability
- Lead free product is acquired
- Surface mount package

## Applications

- Battery protection
- Load switch
- Power management

Absolute Maximum Ratings  $T_c=25^\circ\text{C}$  unless otherwise noted

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-20	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Drain Current – Continuous ( $T_c=25^\circ\text{C}$ )	-6.2	A
	Drain Current – Continuous ( $T_c=100^\circ\text{C}$ )	-4.1	A
$I_{DM}$	Drain Current – Pulsed <sup>1</sup>	-20	A
$P_D$	Power Dissipation ( $T_c=25^\circ\text{C}$ )	0.8	W
	Power Dissipation ( $T_c=100^\circ\text{C}$ )	0.01	W/ $^\circ\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

## Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	61	$^\circ\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	23	$^\circ\text{C}/\text{W}$

Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)

## Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	-20	---	---	V
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V, T_J=25^\circ\text{C}$	---	---	1	$\mu A$
		$V_{DS}=-20V, V_{GS}=0V, T_J=125^\circ\text{C}$	---	---	10	$\mu A$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0V$	---	---	$\pm 100$	nA

## On Characteristics

$R_{DS(ON)}$	Static Drain-Source On-Resistance	$V_{GS}=-4.5V, I_D=-6.5A$	---	21	26	$m\Omega$
		$V_{GS}=-2.5V, I_D=-5A$	---	30	37	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\mu A$	-0.5	-0.8	-1.2	V
$g_{fs}$	Forward Transconductance	$V_{DS}=-5V, I_S=-4A$	---	10	---	S

## Dynamic and switching Characteristics

$Q_g$	Total Gate Charge	$V_{DS}=-10V, V_{GS}=-4.5V, I_D=-4A$	---	13	---	nC
$Q_{gs}$	Gate-Source Charge		---	1.8	---	
$Q_{gd}$	Gate-Drain Charge		---	3.2	---	
$T_{d(on)}$	Turn-On Delay Time	$V_{DD}=-10V, I_D=-4A$ $V_{GS}=-4.5V, R_G=3.3\Omega$	---	14	---	ns
$T_r$	Rise Time		---	11	---	
$T_{d(off)}$	Turn-Off Delay Time		---	18	---	
$T_f$	Fall Time		---	23	---	
$C_{iss}$	Input Capacitance	$V_{DS}=-10V, V_{GS}=0V, F=1\text{MHz}$	---	1217	---	pF
$C_{oss}$	Output Capacitance		---	183	---	
$C_{rss}$	Reverse Transfer Capacitance		---	118	---	

## Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$I_S$	Continuous Source Current	$V_G=V_D=0V, \text{Force Current}$	---	---	-6.2	A
$I_{SM}$	Pulsed Source Current		---	---	-15	A
$V_{SD}$	Diode Forward Voltage	$V_{GS}=0V, I_S=-1A, T_J=25^\circ\text{C}$	---	---	-1.2	V

Note :

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.
3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics (Curves)

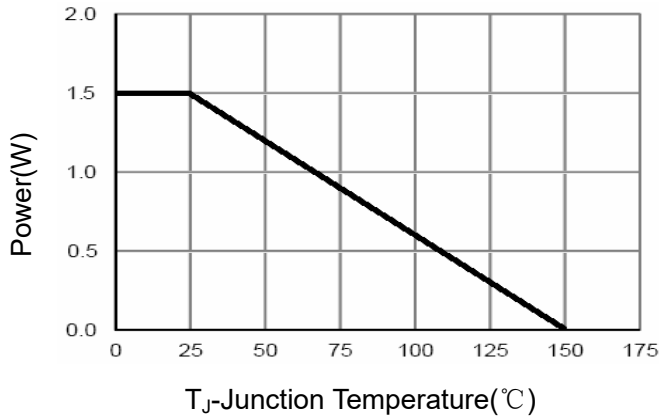


Figure 1 Power Dissipation

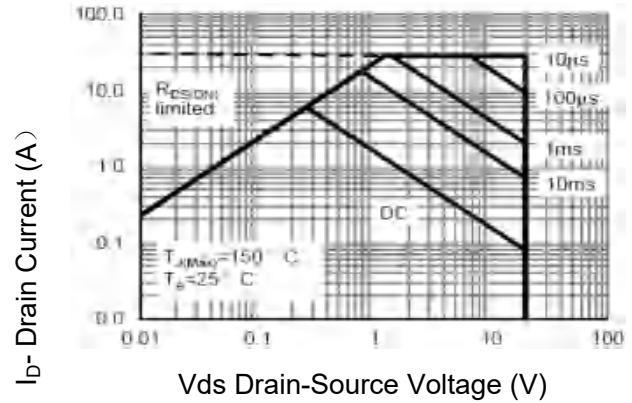


Figure 2 Safe Operation Area

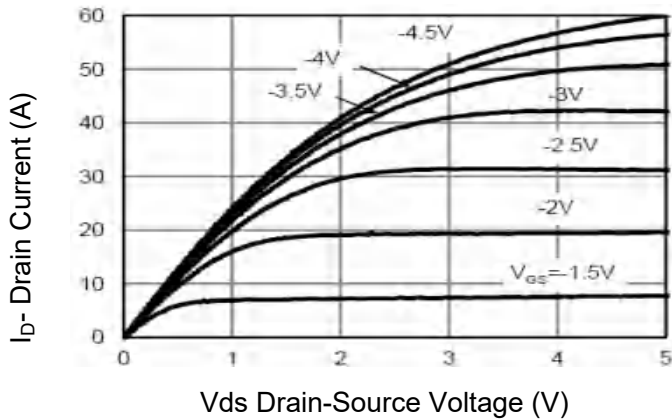


Figure 3 Output Characteristics

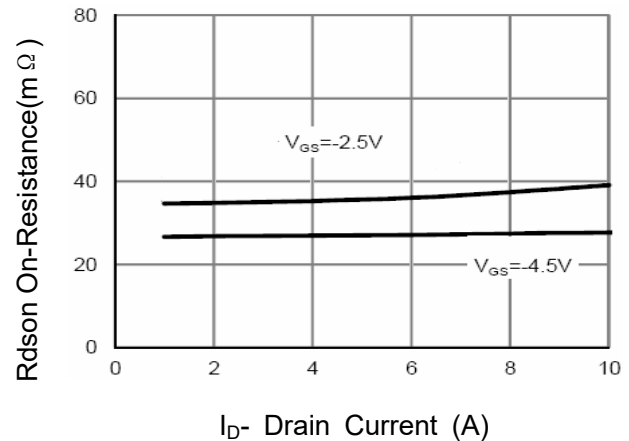


Figure 4 Drain-Source On-Resistance

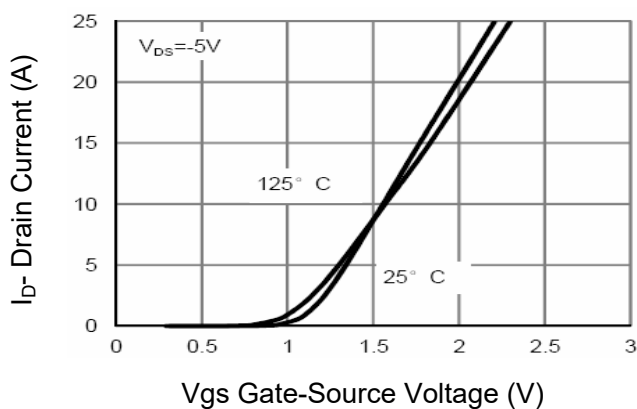


Figure 5 Transfer Characteristics

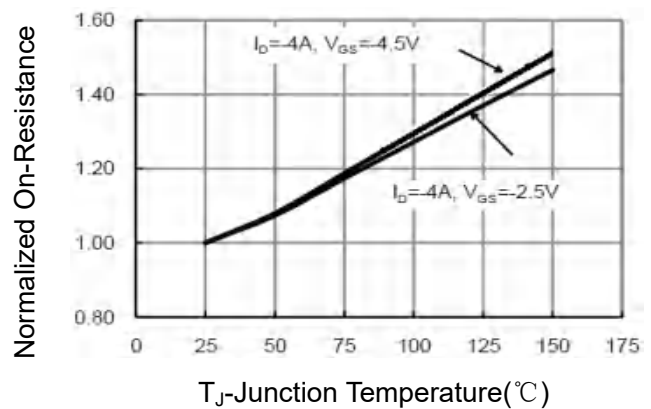
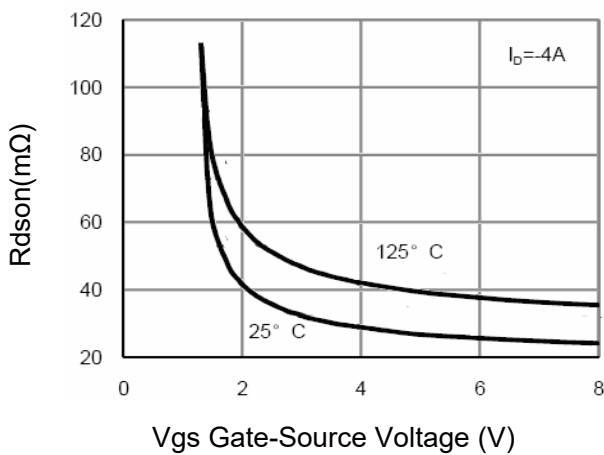
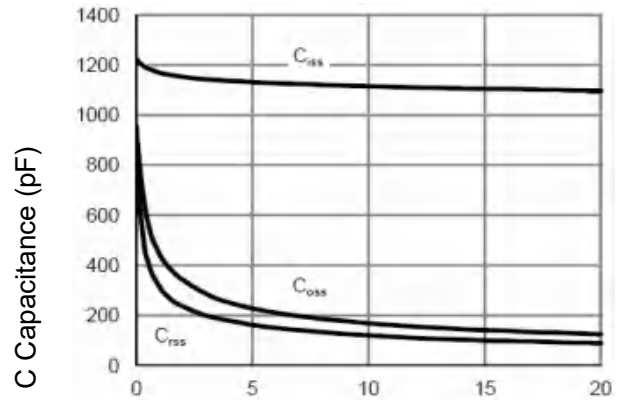


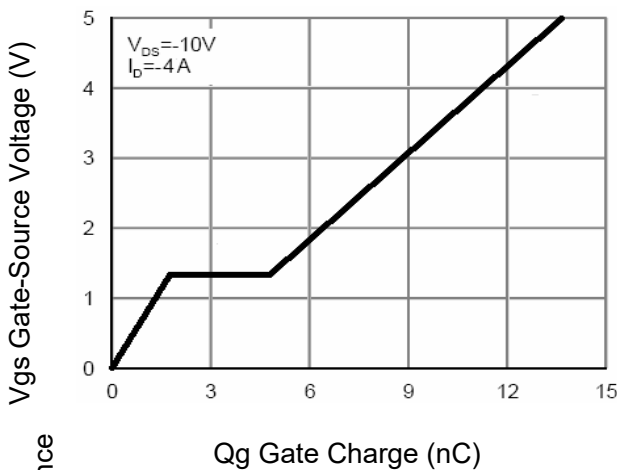
Figure 6 Drain-Source On-Resistance



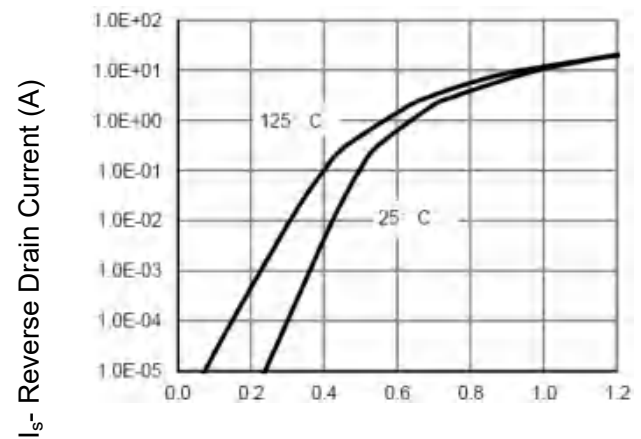
Vgs Gate-Source Voltage (V)  
Figure 9 Rdson vs Vgs



Vds Drain-Source Voltage (V)  
Figure 10 Capacitance vs Vds



Qg Gate Charge (nC)  
Figure 11 Gate Charge



Vsd Source-Drain Voltage (V)  
Figure 12 Source- Drain Diode Forward

r(t), Normalized Effective Transient Thermal Impedance

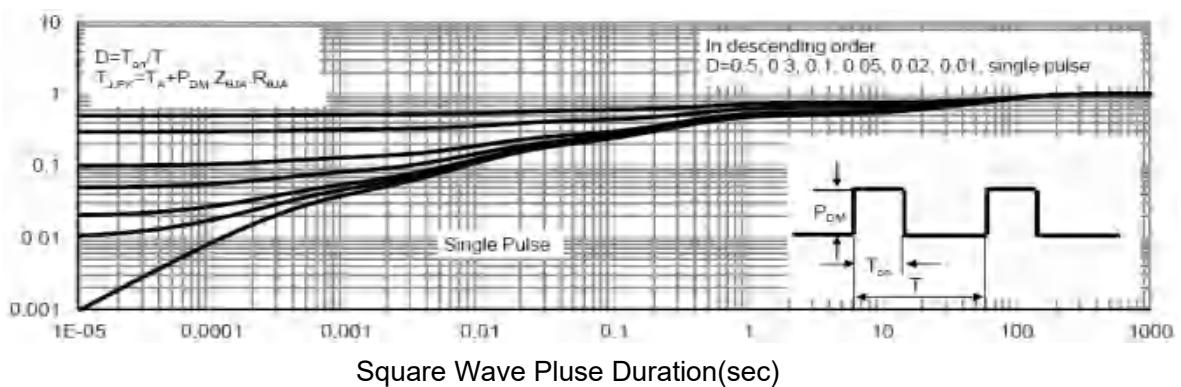


Figure 13 Normalized Maximum Transient Thermal Impedance