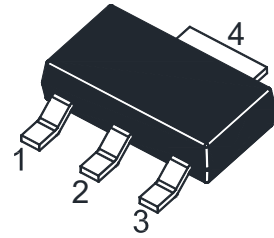
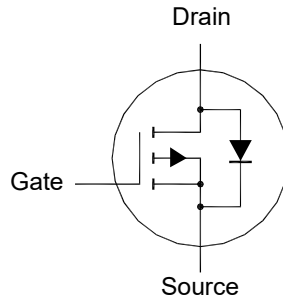


# WTQ06P700LS-HAF

## P-Channel Enhancement Mode MOSFET

### Features

- Surface-mounted package
- Low Gate-Source Threshold Voltage
- Halogen and Antimony Free(HAF), RoHS compliant



1.Gate 2.Drain 3.Source 4.Drain  
SOT-223 Plastic Package

### Applications

- Motor Drive
- Synchronus Rectification in DC/DC and AC/DC Converters

### Key Parameters

Parameter	Value	Unit
$-BV_{DSS}$	60	V
$R_{DS(ON)}$ Max	90 @ $-V_{GS} = 10$ V	m $\Omega$
	110 @ $-V_{GS} = 4.5$ V	
$-V_{GS(th)}$ typ	1.8	V
$Q_g$ typ	16 @ $-V_{GS} = 10$ V	nC

### Absolute Maximum Ratings (at $T_a = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$-V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current	$-I_D$	9 6	A
Peak Drain Current, Pulsed <sup>1)</sup>	$-I_{DM}$	35	A
Single-Pulse Avalanche Current	$-I_{AS}$	17	A
Single-Pulse Avalanche Energy <sup>2)</sup>	$E_{AS}$	14	mJ
Power Dissipation	$P_D$	12.5	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to + 150	$^\circ\text{C}$

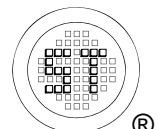
### Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance from Junction to Case	$R_{\theta JC}$	10	$^\circ\text{C/W}$
Thermal Resistance from Junction to Ambient <sup>3)</sup>	$R_{\theta JA}$	50	$^\circ\text{C/W}$

<sup>1)</sup> Pulse Test: Pulse Width  $\leq 100$   $\mu\text{s}$ , Duty Cycle  $\leq 2\%$ , Repetitive rating, pulse width limited by junction temperature  $T_{J(MAX)} = 150^\circ\text{C}$ .

<sup>2)</sup> Limited by  $T_{J(MAX)}$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.1$  mH,  $R_g = 25$   $\Omega$ ,  $-I_{AS} = 17$  A,  $-V_{GS} = 10$  V.

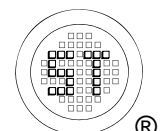
<sup>3)</sup> Device mounted on FR-4 substrate PC board, 2oz copper, with 1-inch square copper plate in still air.



# WTQ06P700LS-HAF

Characteristics at  $T_a = 25^\circ\text{C}$  unless otherwise specified

Parameter	Symbol	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>					
Drain-Source Breakdown Voltage at $-I_D = 250 \mu\text{A}$	$-BV_{DSS}$	60	-	-	V
Drain-Source Leakage Current at $-V_{DS} = 48 \text{ V}$	$-I_{DSS}$	-	-	1	$\mu\text{A}$
Gate Leakage Current at $V_{GS} = \pm 20 \text{ V}$	$I_{GSS}$	-	-	$\pm 100$	nA
Gate-Source Threshold Voltage at $V_{DS} = V_{GS}$ , $-I_D = 250 \mu\text{A}$	$-V_{GS(th)}$	1.2	-	2.5	V
Drain-Source On-State Resistance at $-V_{GS} = 10 \text{ V}$ , $-I_D = 5.7 \text{ A}$ at $-V_{GS} = 4.5 \text{ V}$ , $-I_D = 4.4 \text{ A}$	$R_{DS(on)}$	-	70	90 110	$\text{m}\Omega$
<b>DYNAMIC PARAMETERS</b>					
Forward Transconductance at $-V_{DS} = 15 \text{ V}$ , $-I_D = 5.7 \text{ A}$	$g_{fs}$	-	5	-	S
Gate Resistance at $V_{GS} = 0 \text{ V}$ , $V_{DS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$	$R_g$	-	7	-	$\Omega$
Input Capacitance at $-V_{DS} = 30 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{iss}$	-	950	-	pF
Output Capacitance at $-V_{DS} = 30 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{oss}$	-	51	-	pF
Reverse Transfer Capacitance at $-V_{DS} = 30 \text{ V}$ , $V_{GS} = 0 \text{ V}$ , $f = 1 \text{ MHz}$	$C_{rss}$	-	19	-	pF
Total Gate Charge at $-V_{DS} = 30 \text{ V}$ , $-V_{GS} = 10 \text{ V}$ , $-I_D = 5.7 \text{ A}$ at $-V_{DS} = 30 \text{ V}$ , $-V_{GS} = 4.5 \text{ V}$ , $-I_D = 5.7 \text{ A}$	$Q_g$	-	16 7	-	nC
Gate-Source Charge at $-V_{DS} = 30 \text{ V}$ , $-V_{GS} = 10 \text{ V}$ , $-I_D = 5.7 \text{ A}$	$Q_{gs}$	-	4	-	nC
Gate-Drain Charge at $-V_{DS} = 30 \text{ V}$ , $-V_{GS} = 10 \text{ V}$ , $-I_D = 5.7 \text{ A}$	$Q_{gd}$	-	3	-	nC
Turn-On Delay Time at $-V_{DD} = 30 \text{ V}$ , $-V_{GS} = 10 \text{ V}$ , $-I_D = 5.7 \text{ A}$ , $R_g = 4.7 \Omega$	$t_{d(on)}$	-	9	-	ns
Turn-On Rise Time at $-V_{DD} = 30 \text{ V}$ , $-V_{GS} = 10 \text{ V}$ , $-I_D = 5.7 \text{ A}$ , $R_g = 4.7 \Omega$	$t_r$	-	11	-	ns
Turn-Off Delay Time at $-V_{DD} = 30 \text{ V}$ , $-V_{GS} = 10 \text{ V}$ , $-I_D = 5.7 \text{ A}$ , $R_g = 4.7 \Omega$	$t_{d(off)}$	-	14	-	ns
Turn-Off Fall Time at $-V_{DD} = 30 \text{ V}$ , $-V_{GS} = 10 \text{ V}$ , $-I_D = 5.7 \text{ A}$ , $R_g = 4.7 \Omega$	$t_f$	-	3	-	ns
<b>Body-Diode PARAMETERS</b>					
Drain-Source Diode Forward Voltage at $-I_s = 1 \text{ A}$ , $V_{GS} = 0 \text{ V}$	$-V_{SD}$	-	-	1.2	V
Body-Diode Continuous Current	$-I_s$	-	-	9	A
Body-Diode Continuous Current, Pulsed	$-I_{SM}$	-	-	35	A
Body Diode Reverse Recovery Time at $-I_s = 5.7 \text{ A}$ , $di/dt = 100 \text{ A} / \mu\text{s}$	$t_{rr}$	-	13	-	ns
Body Diode Reverse Recovery Charge at $-I_s = 5.7 \text{ A}$ , $di/dt = 100 \text{ A} / \mu\text{s}$	$Q_{rr}$	-	9	-	nC



## Electrical Characteristics Curves

Fig. 1 Typical Output Characteristics

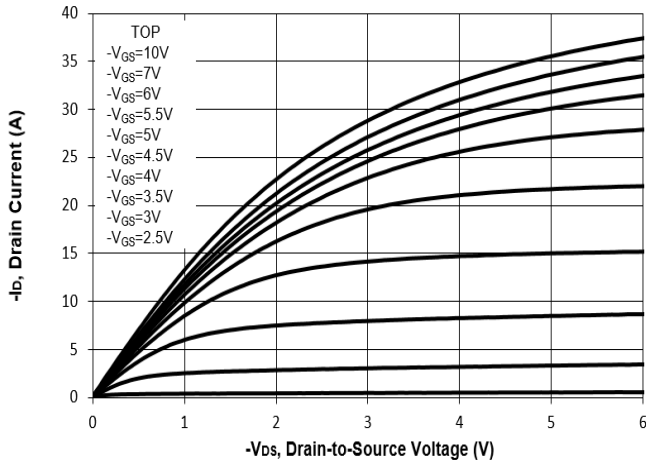


Fig. 2 Typical Transfer Characteristics

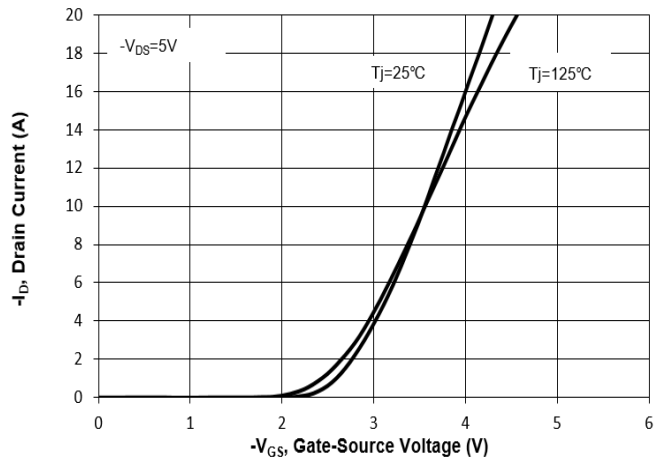


Fig. 3 On-Resistance vs. Drain Current

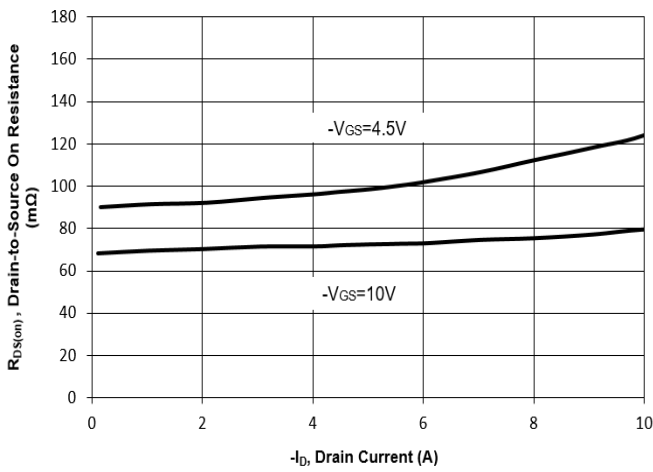


Fig. 4 On-Resistance vs. Gate to Source Voltage

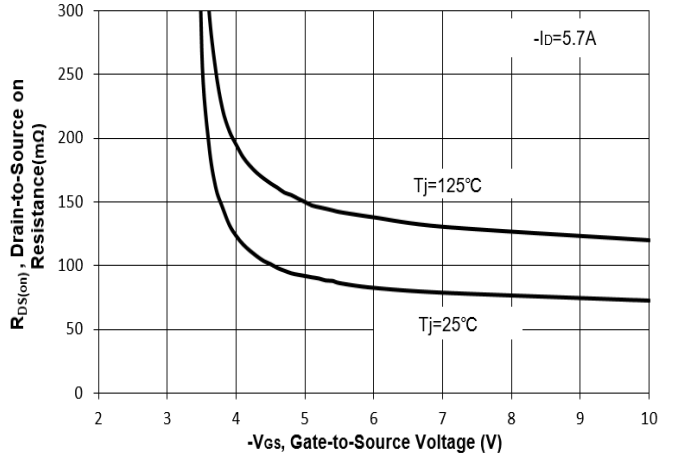


Fig. 5 On-Resistance vs. TJ

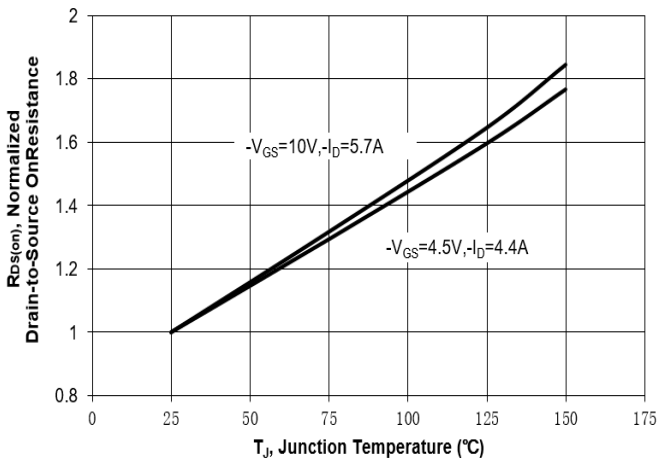
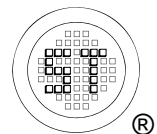
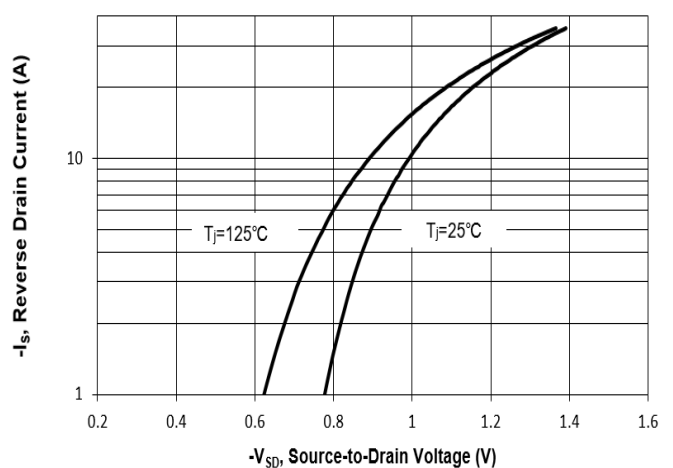


Fig. 6 Typical Body-Diode Forward Characteristics



# WTQ06P700LS-HAF

## Electrical Characteristics Curves

Fig. 7 Typical Junction Capacitance

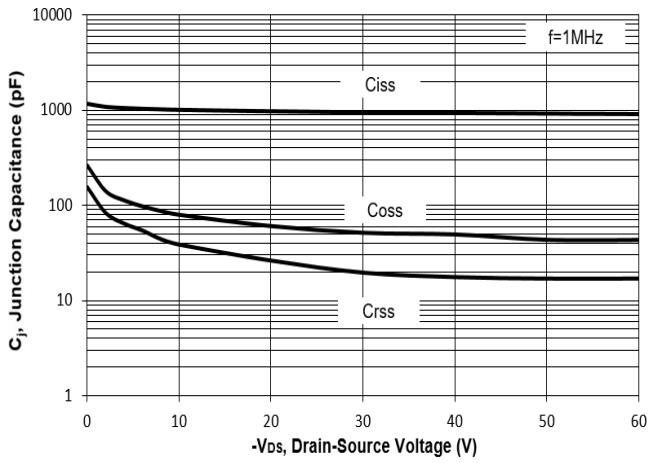


Fig. 8 Drain-Source Leakage Current vs. T<sub>J</sub>

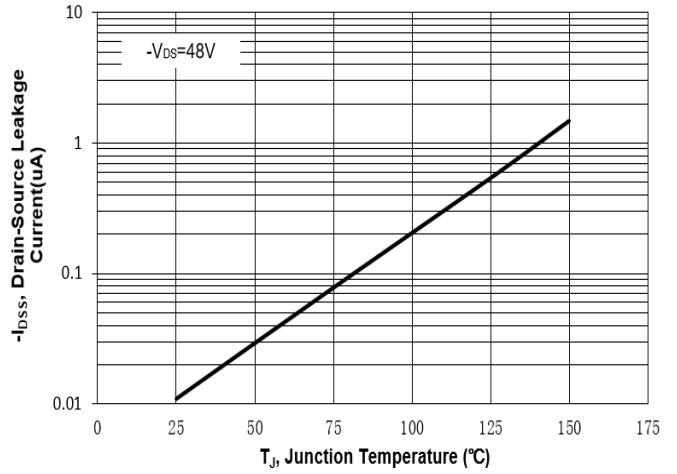


Fig. 9 V<sub>(BR)DSS</sub> vs. Junction Temperature

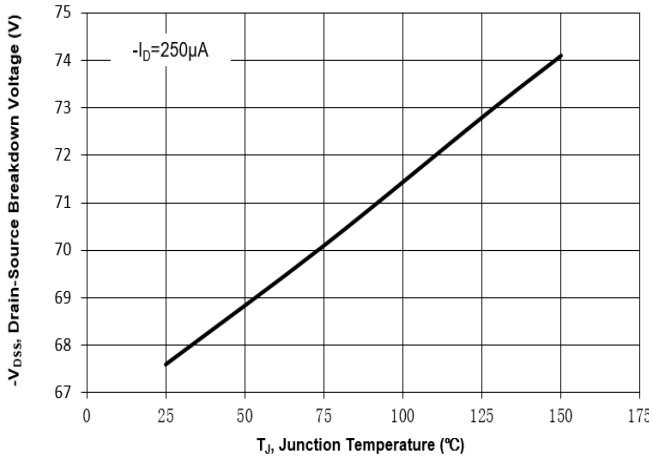


Fig. 10 Gate Threshold Variation vs. T<sub>J</sub>

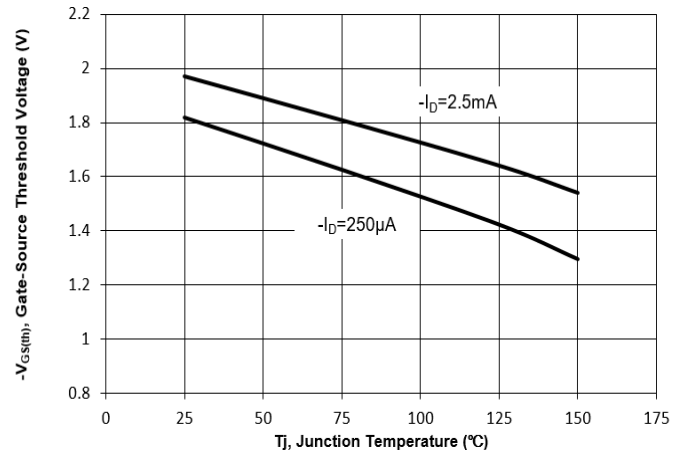


Fig. 11 Gate Charge

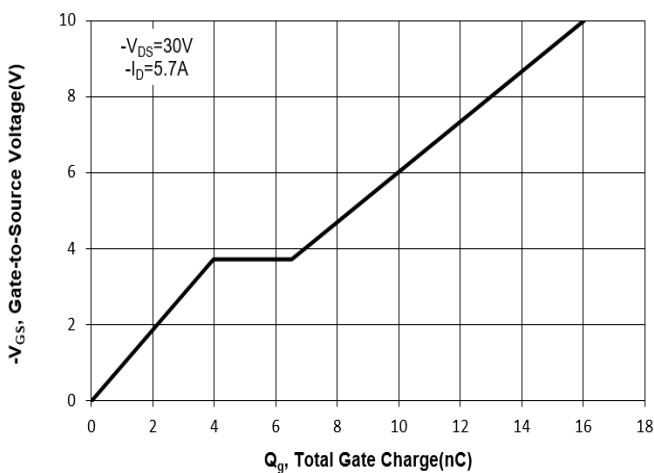
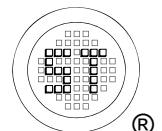
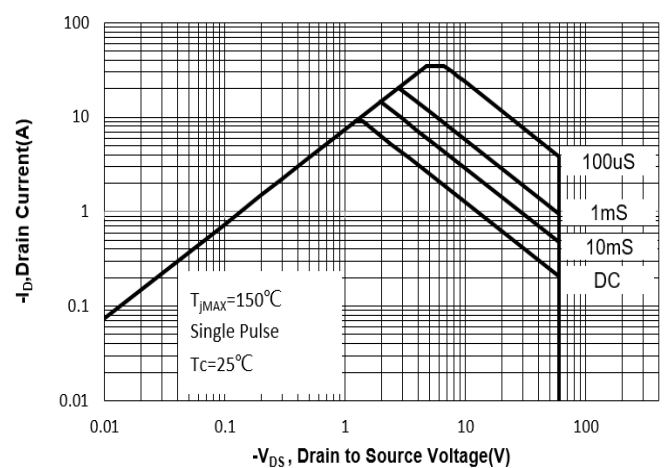


Fig. 12 Safe Operation Area



# WTQ06P700LS-HAF

## Electrical Characteristics Curves

Fig.13 Normalized Maximum Transient Thermal Impedance( $Z_{\theta JC}$ )

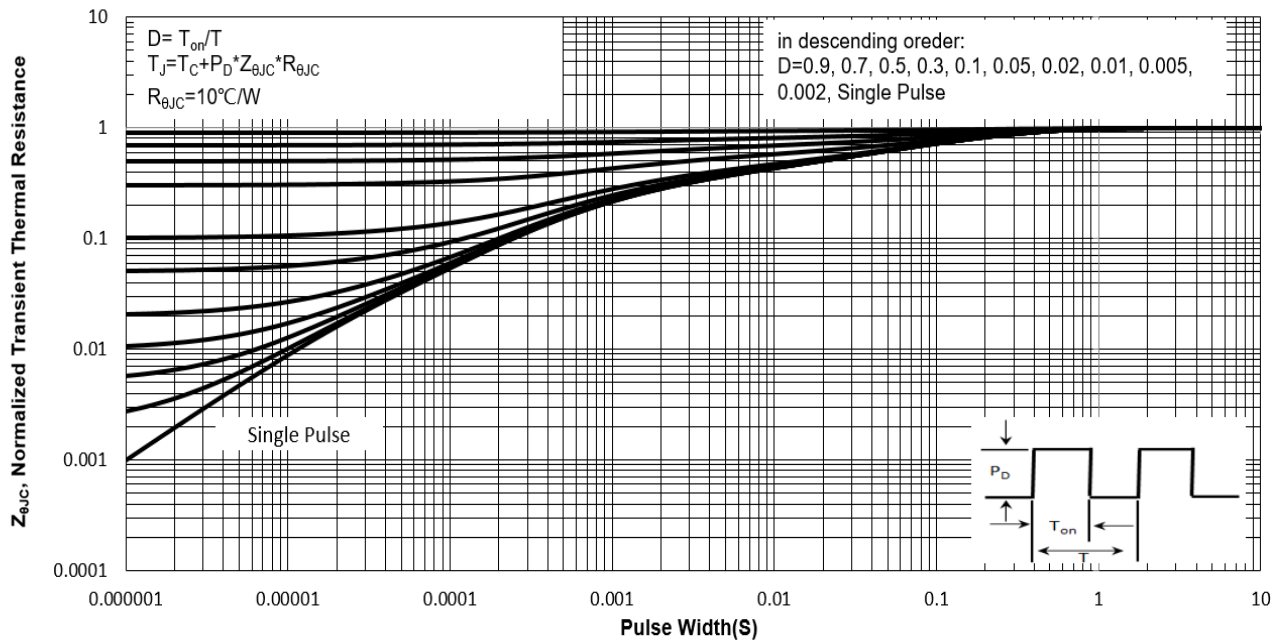
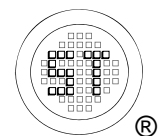
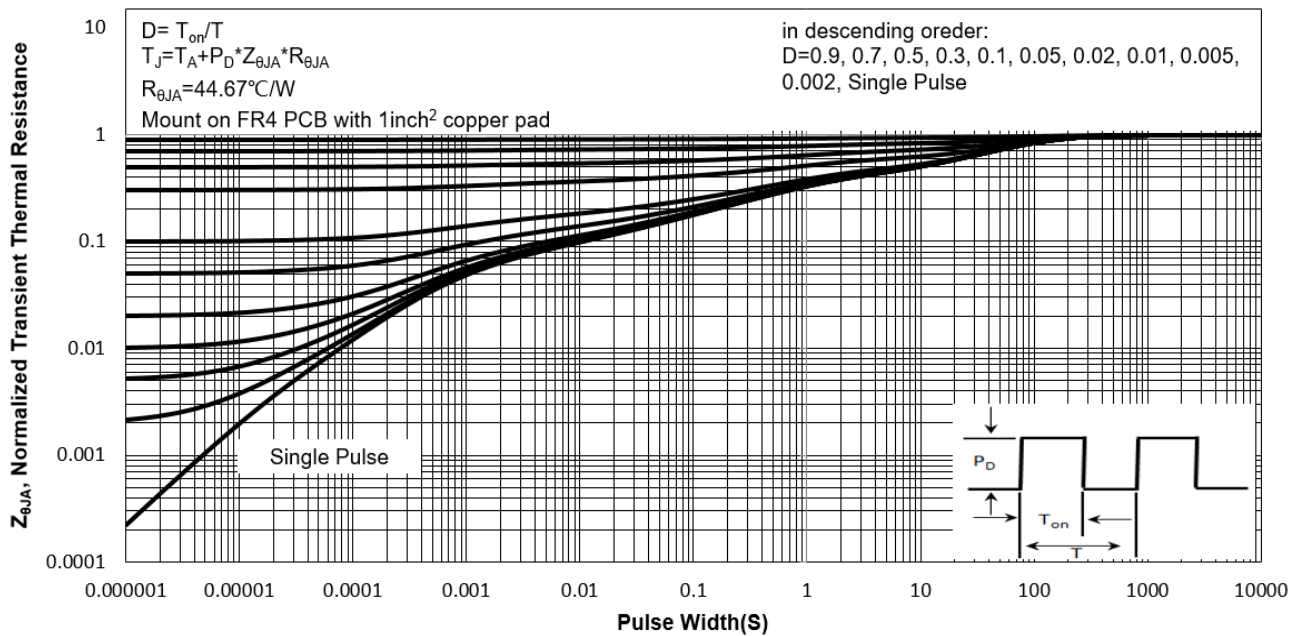


Fig.14 Normalized Maximum Transient Thermal Impedance( $Z_{\theta JA}$ )



## Test Circuits

Fig.1-1 Switching times test circuit

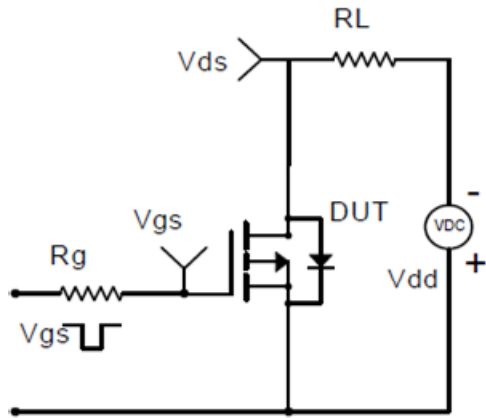


Fig.1-2 Switching Waveform

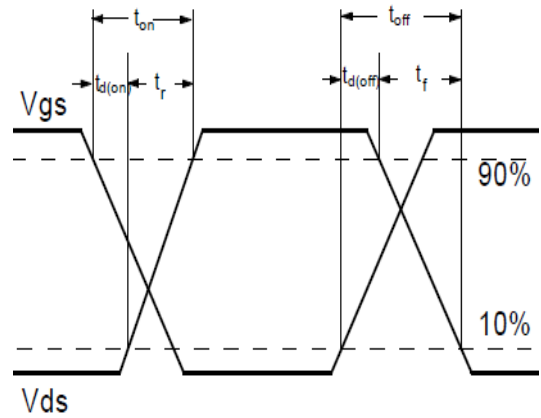


Fig.2-1 Gate charge test circuit

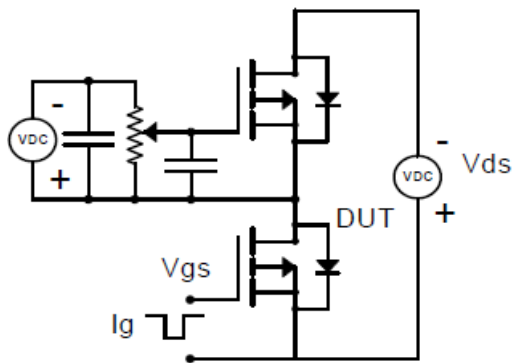


Fig.2-2 Gate charge waveform

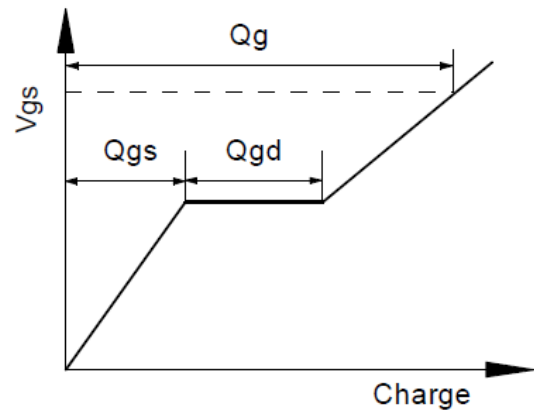


Fig.3-1 Avalanche test circuit

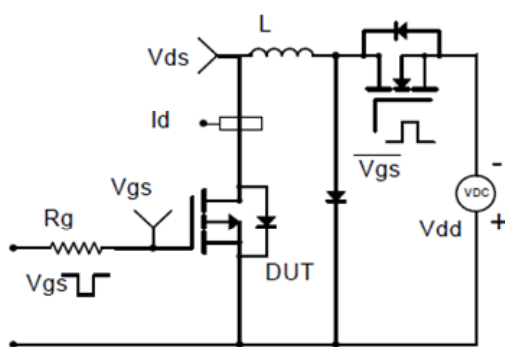
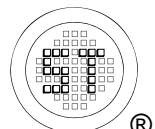
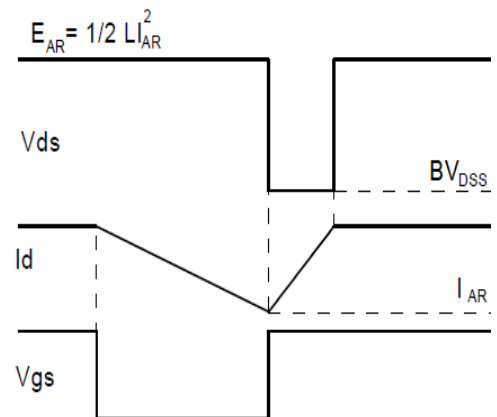


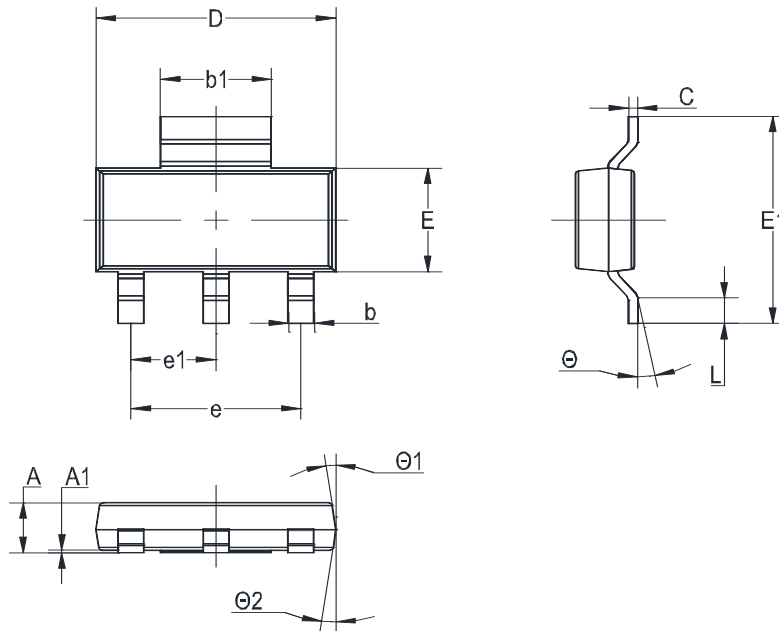
Fig.3-2 Avalanche waveform



# WTQ06P700LS-HAF

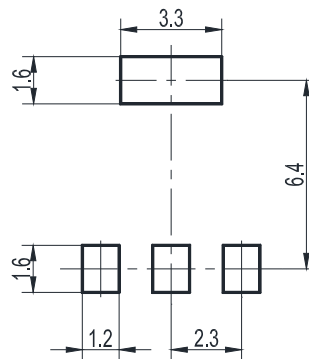
## Package Outline (Dimensions in mm)

SOT-223



Unit	A	A1	b	b1	C	D	E	E1	e	e1	L	$\Theta$	$\Theta_1$	$\Theta_2$
mm	1.8	0.1	0.8	3.1	0.32	6.7	3.7	7.3	4.6	2.3	1.1	$10^\circ$	$7^\circ$	$7^\circ$
	1.5	MAX	0.6	2.9	0.22	6.3	3.3	6.7	TYP	TYP	0.7	$0^\circ$	$0^\circ$	$0^\circ$

## Recommended Soldering Footprint



## Packing information

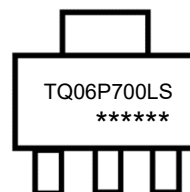
Package	Tape Width (mm)	Pitch		Reel Size		Per Reel Packing Quantity
		mm	inch	mm	inch	
SOT-223	12	$8 \pm 0.1$	$0.315 \pm 0.004$	330	13	3,000

## Marking information

" TQ06P700LS " = Part No.

" \*\*\*\*\* " = Date Code Marking

Font type: Arial



Disclaimer: Our company reserve the right to make modifications, enhancements, improvements, corrections or other changes to improve product design, functions and reliability, anytime without notice.

