

## General Description

The XXW12P04 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as -4.5V. This device is suitable for use as a wide variety of applications.

## Features

$V_{DS} = -40V, I_D = -12A$   
 $R_{DS(ON)} < 36m\Omega @ V_{GS} = -10V$   
 $R_{DS(ON)} < 52m\Omega @ V_{GS} = -4.5V$

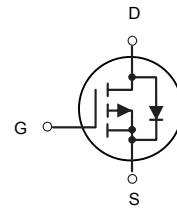
High Power and current handing capability  
 Lead free product is acquired  
 Surface Mount Package

## Application

PWM applications  
 Load switch  
 Power management



**TO252-2L**



P-Channel MOSFET

## Absolute Maximum Ratings ( $T_A=25^\circ C$ )

Symbol	Parameter	Value	Unit
$V_{DS}$	Drain-Source Voltage ( $V_{GS}=0V$ )	-40	V
$V_{GS}$	Gate-Source Voltage ( $V_{DS}=0V$ )	$\pm 20$	V
$I_D$	Drain Current-Continuous( $T_c=25^\circ C$ )	-12	A
	Drain Current-Continuous( $T_c=100^\circ C$ )	-10	A
$I_{DM (pluse)}$	(Note 1) Drain Current-Continuous@ Current-Pulsed	-80	A
$P_D$	Maximum Power Dissipation( $T_c=25^\circ C$ )	37.5	W
	Maximum Power Dissipation( $T_c=100^\circ C$ )	19	W
$T_J, T_{STG}$	Operating Junction and Storage Temperature Range	-55 To 175	$^\circ C$

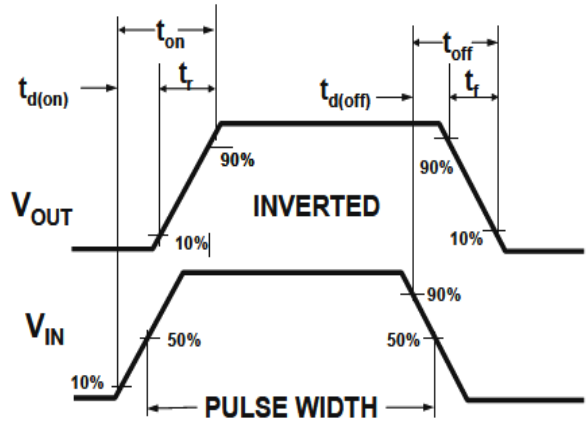
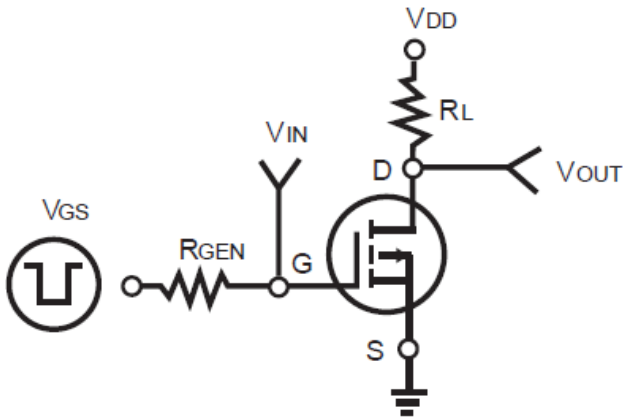
$R_{JC}$	Thermal Resistance, Junction-to-Case	4	$^{\circ}\text{C}/\text{W}$
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**Electrical Characteristics (TA=25°C unless otherwise noted)**

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-40			V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS}=-32V, V_{GS}=0V$			-1	$\mu A$
$I_{GSS}$	Gate-Body Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-2	-3	V
$g_{FS}$	Forward Transconductance	$V_{DS}=-5V, I_D=-10A$		25		S
$R_{DS(on)}$	Drain-Source On-State Resistance	$V_{GS}=-10V, I_D=-20A$		25	36	m $\Omega$
		$V_{GS}=-4.5V, I_D=-10A$		42	52	m $\Omega$
$C_{iss}$	Input Capacitance	$V_{DS}=-25V, V_{GS}=0V,$ $f=1.0\text{MHz}$		840		pF
$C_{oss}$	Output Capacitance			92		pF
$C_{riss}$	Reverse Transfer Capacitance			60		pF
$t_{d(on)}$	Turn-on Delay Time	$V_{GS}=-10V, V_{DS}=-20V,$ $R_L=1.6\Omega, R_{GEN}=3\Omega$		5		nS
$t_r$	Turn-on Rise Time			12		nS
$t_{d(off)}$	Turn-Off Delay Time			20		nS
$t_f$	Turn-Off Fall Time			4.5		nS
$Q_g$	Total Gate Charge	$V_{GS}=-10V, V_{DS}=-20V, I_D=-15A$		20		nC
$Q_{gs}$	Gate-Source Charge			2.5		nC
$Q_{gd}$	Gate-Drain Charge			4.5		nC
$I_{SD}$	Source-Drain Current(Body Diode)				-20	A
$V_{SD}$	Forward on Voltage	$V_{GS}=0V, I_S=-20A$			-1.2	V

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

**Switch Time Test Circuit and Switching Waveforms:**



**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)**

Figure1. Power Dissipation

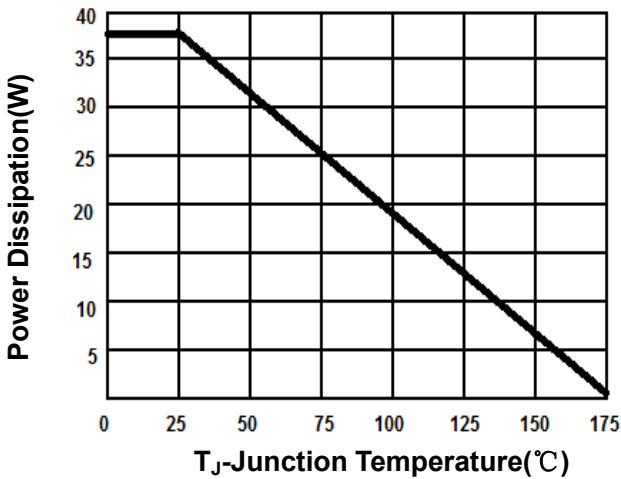


Figure2. Drain Current

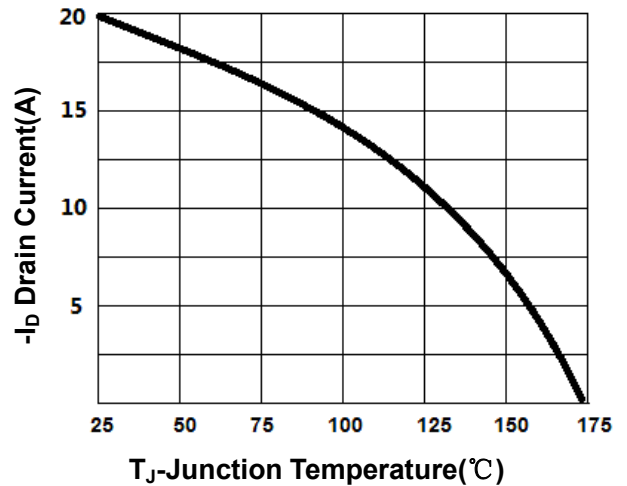


Figure3. Output Characteristics

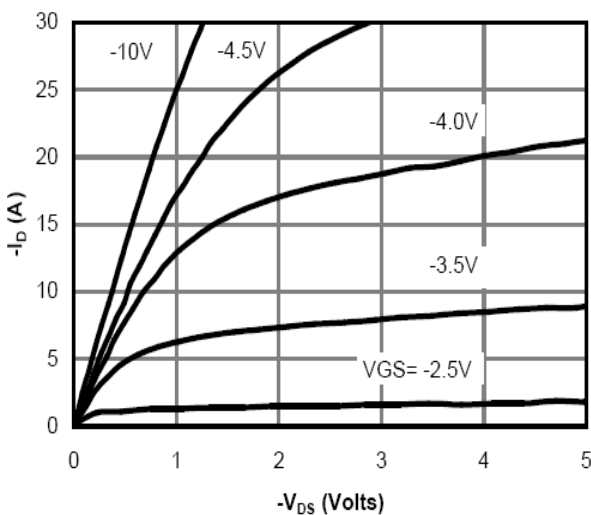
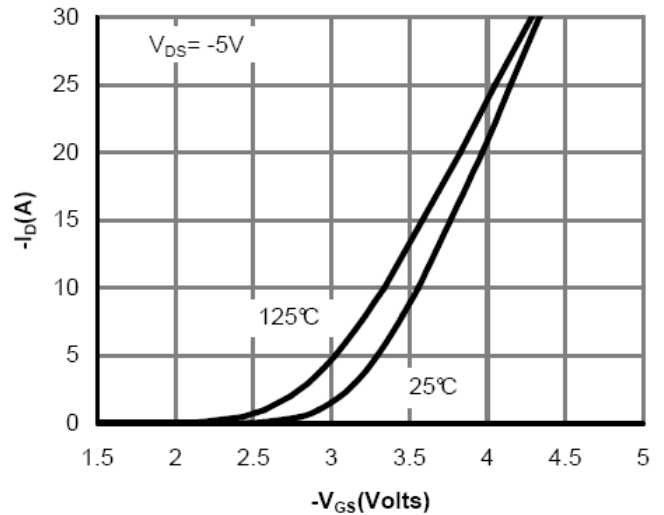
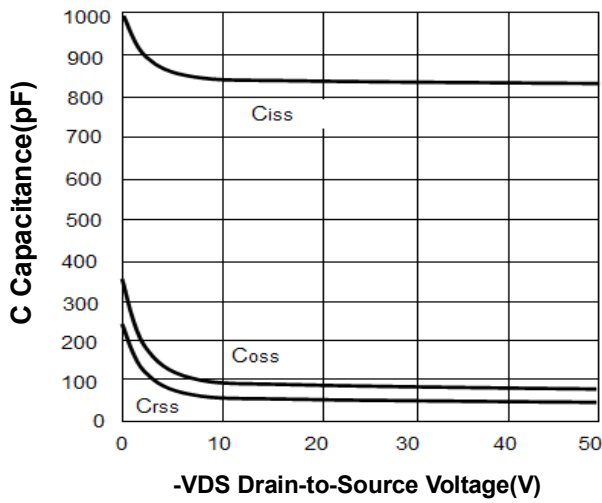
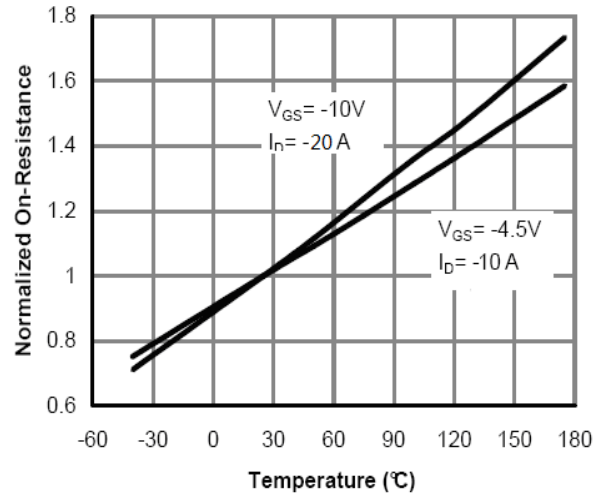
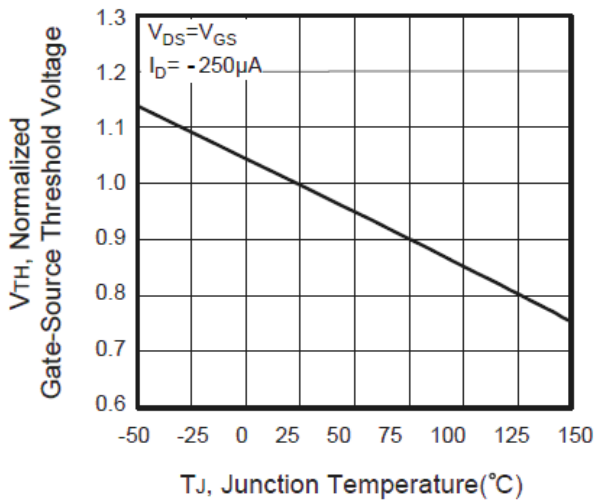
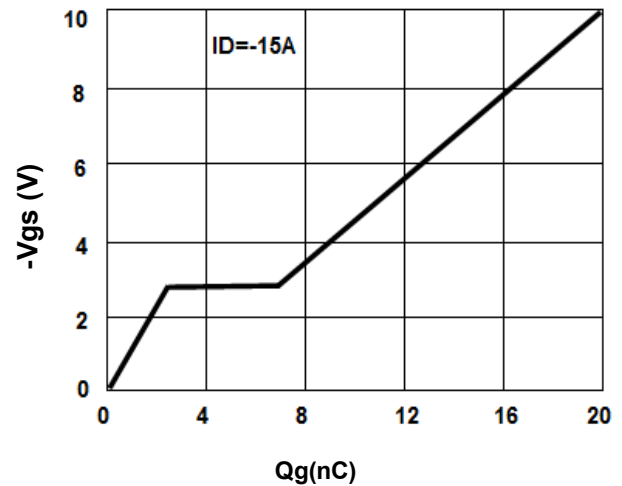
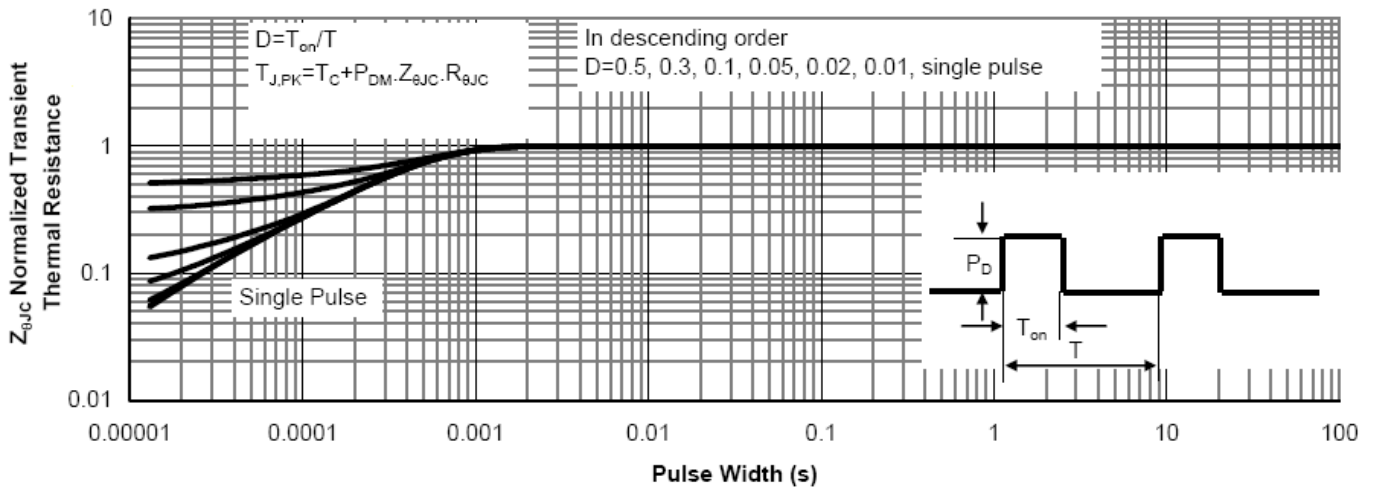
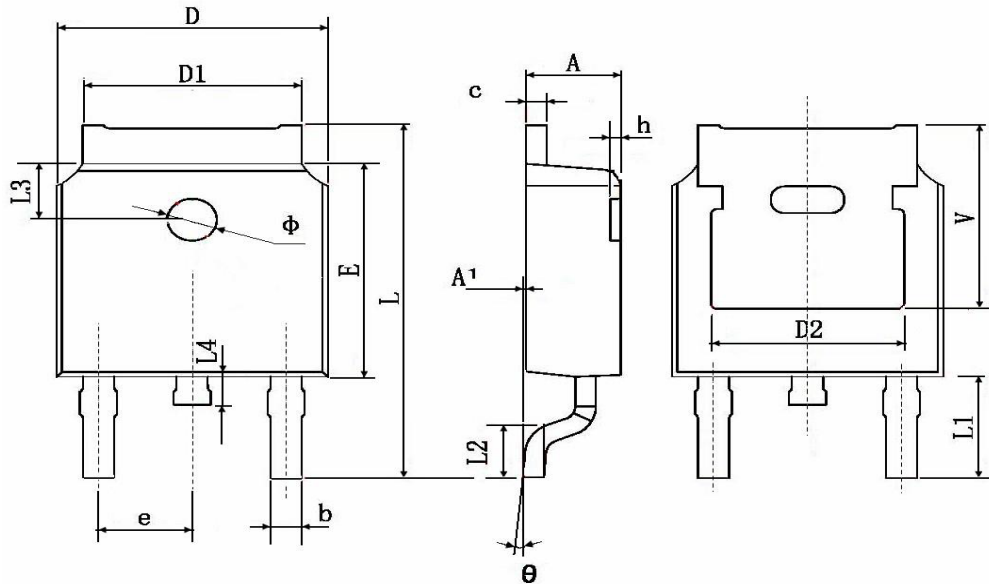


Figure4. Transfer Characteristics



**Figure5. Capacitance**

**Figure6.  $R_{DS(ON)}$  vs Junction Temperature**

**Figure7.  $V_{GS(th)}$  vs Junction Temperature**

**Figure8. Gate Charge Waveforms**

**Figure9. Normalized Maximum Transient Thermal Impedance**


**TO252-2L Package Information**


Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	