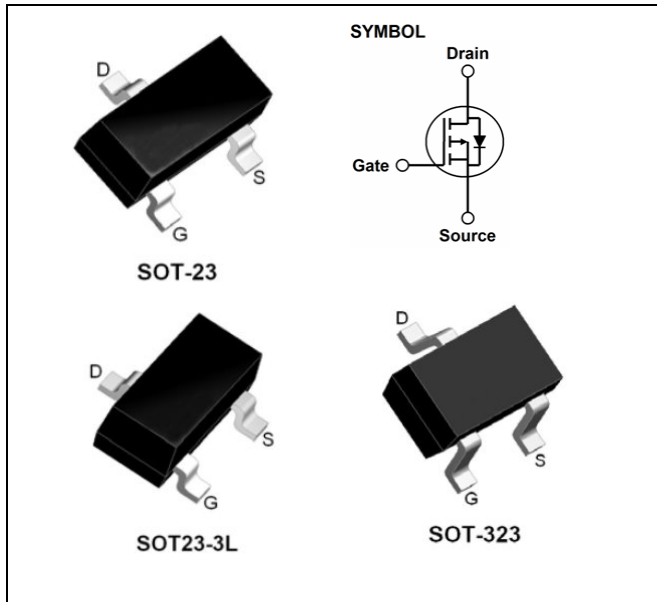


P-CHANNEL ENHANCEMENT MODE MOSFET



FEATURES

- -20V/-2.5A, $R_{DS(ON)} = 85m\Omega$ (Typ.) @ $V_{GS} = -4.5V$
 $R_{DS(ON)} = 110m\Omega$ (Typ.) @ $V_{GS} = -2.5V$
- Super High Density Cell Design
- High Ruggedness and Reliable
- Surface Mount Package

MECHANICAL DATA

- Available in SOT-23-3 , SOT-23-3L & SOT-323 Package
- Solderability : MIL-STD-202, Method 208
- Full RoHS Compliance

ORDERING INFORMATION

PART NUMBER	PACKAGE	SHIPPING	MARKING CODE
LS2301P□-T3R	SOT-23	Tape Reel	W6yww
LS2301P□-T3LR	SOT-23-3L	Tape Reel	
LS2301P□-3T3R	SOT-323	Tape Reel	81

Notes:

1. □: none is for Lead Free package;
"G" is for Halogen Free package.
2. Marking Code: yww: y: Year code; ww: Week code.

THERMAL DATA

PARAMETER		SYMBOL	VALUES	UNIT
Thermal Resistance, Junction-to-Ambient	SOT-23	$R_{\theta JA}$	100	°C/W
	SOT-23-3L		100	
	SOT-323		120	
Thermal Resistance, Junction-to-Case	SOT-23	$R_{\theta JC}$	35	°C/W
	SOT-23-3L		35	
	SOT-323		-	

Notes:

3. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. The value of $R_{\theta JA}$ is measured with device mounted on 1 in² FR-4 board with 2 oz copper.

ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$, unless otherwise noted. (Note 4)

PARAMETER		SYMBOL	VALUES	UNIT
Drain-Source Voltage		V_{DSS}	-20	V
Gate-Source Voltage		V_{GSS}	± 12	V
Continuous Drain Current (Note 5)		I_D	-2.5	A
Pulsed Drain Current (Note 6)		I_{DM}	-10	A
Power Dissipation (Note 7) (for SOT-23-3 & SOT-23-3L)	$T_A = 25^\circ\text{C}$	P_D	800	mW
	$T_A = 100^\circ\text{C}$		300	mW
Power Dissipation (Note 7)	SOT-323, $T_A = 25^\circ\text{C}$		600	mW
Continuous Source Current (Diode Conduction) (Note 5)		I_S	-1.5	A
Operating Junction Temperature		T_J	$-55 \sim +150$	$^\circ\text{C}$
Storage Temperature Range		T_{stg}	$-55 \sim +150$	$^\circ\text{C}$

Notes:

- Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.
- The current rating is based on the $t \leq 10\text{s}$ thermal resistance rating.
- Repetitive rating, pulse width limited by maximum junction temperature.
- Surface mounted on 1 in² FR-4 board with 2 oz copper, $t \leq 10\text{sec}$.

ELECTRICAL CHARACTERISTICS

$T_A = 25^\circ\text{C}$, unless otherwise noted.

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0\text{V}$, $I_D = -250\mu\text{A}$	-20			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{V}$, $V_{DS} = -16\text{V}$			-1.0	μA
		$T_J = 85^\circ\text{C}$			-30	μA
Gate-Body Leakage Current	I_{GSS}	$V_{DS} = 0\text{V}$, $V_{GS} = \pm 12\text{V}$			± 100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}$, $I_D = -250\mu\text{A}$	-0.45	-0.7	-1.0	V
Static Drain-Source On Resistance	$R_{DS(ON)}$	$V_{GS} = -4.5\text{V}$, $I_D = -2.5\text{A}$		85	130	m Ω
		$V_{GS} = -2.5\text{V}$, $I_D = -2.0\text{A}$		110	190	
Forward On Voltage (Note 8)	V_{SD}	$V_{GS} = 0\text{V}$, $I_{SD} = -0.5\text{A}$		-0.8	-1.3	V

$T_A = 25^\circ\text{C}$, unless otherwise noted. (Continuous)

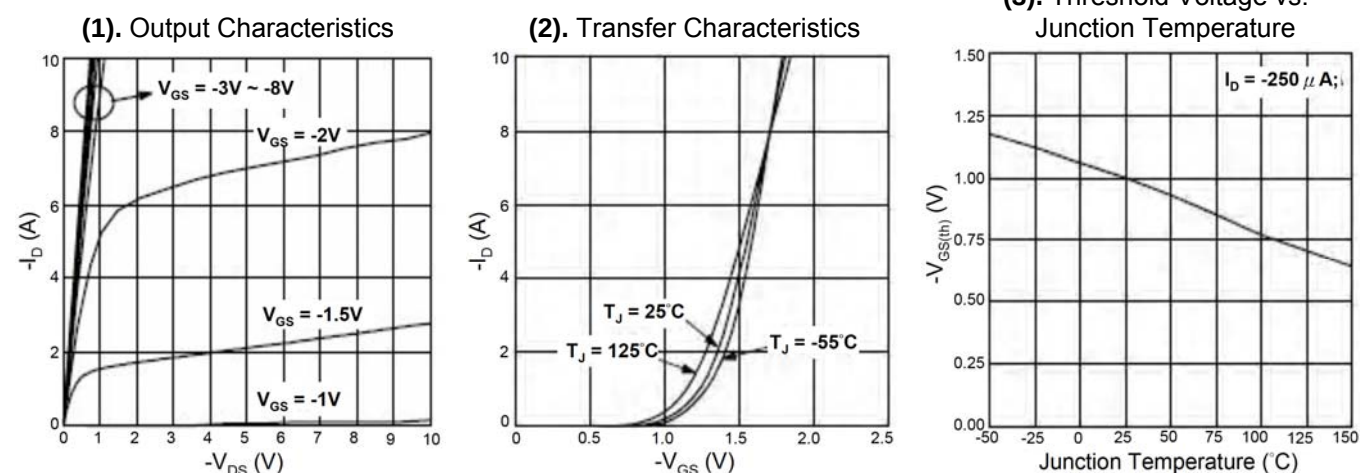
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
DYNAMIC CHARACTERISTICS (Note 9)						
Input Capacitance	C _{iss}	V _{DS} = -15V, V _{GS} = 0V, f = 1 MHz		360		pF
Output Capacitance	C _{oss}			80		pF
Reverse Transfer Capacitance	C _{rss}			50		pF
Gate Resistance	R _G	V _{DS} = 0V, V _{GS} = 0V, f = 1 MHz		9.2		Ω
SWITCHING ON CHARACTERISTICS (Note 9)						
Turn-On Delay Time	t _{d(on)}	V _{DD} = -10V, I _D = -1A, R _g = 6Ω, V _{GS} = -4.5V, R _L = 10Ω		8	16	ns
Rise Time	t _r			7	15	
Total Gate Charge	Q _g	V _{DS} = -10V, I _D = -2.5A, V _{GS} = -4.5V		5	7	nC
Gate-Source Charge	Q _{gS}			0.7		
Gate-Drain Charge	Q _{gd}			0.6		
SWITCHING OFF (Note 9)						
Turn-Off Delay Time	t _{d(off)}	V _{DD} = -10V, I _D = -1A, R _g = 6Ω, V _{GS} = -4.5V, R _L = 10Ω		18	35	ns
Fall Time	t _f			8	15	

Notes:

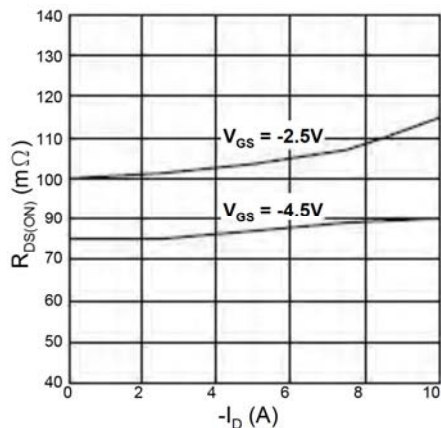
8. Pulse Test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2\%$.
9. Guaranteed by design, not subject to production testing.

TYPICAL PERFORMANCE CHARACTERISTICS

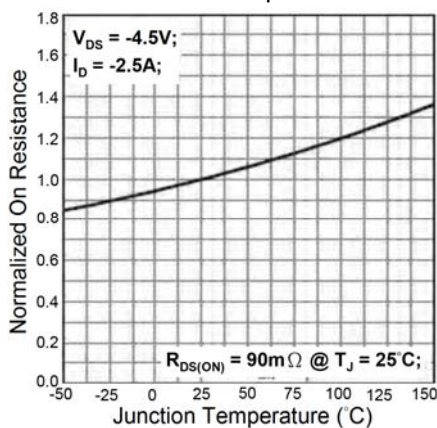
All figures are measured at $T_A = 25^\circ\text{C}$, unless otherwise noted.



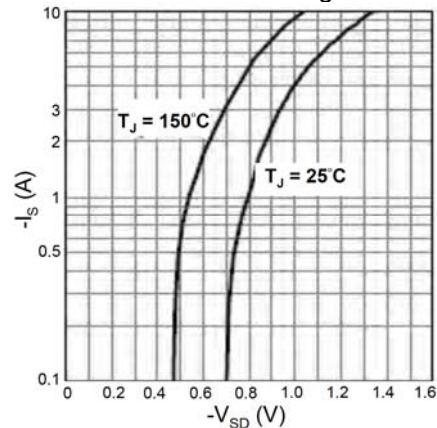
(4). On-Resistance vs. Drain Current



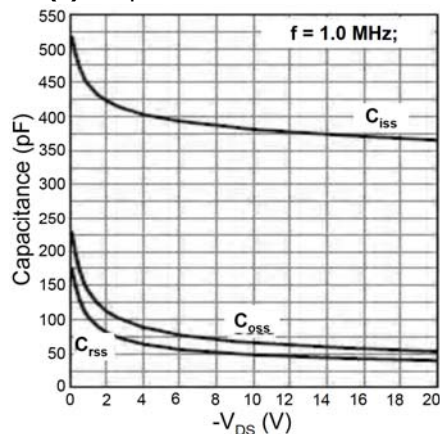
(5). On-Resistance vs. Junction Temperature



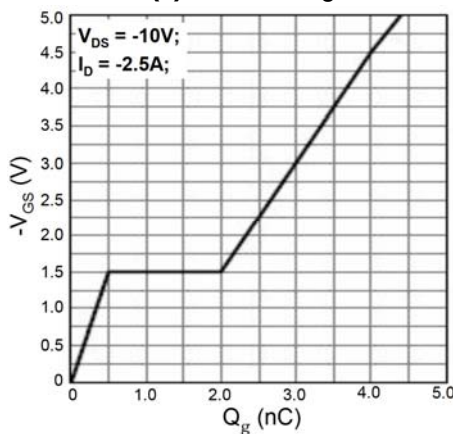
(6). Source-Drain Diode Forward Voltage



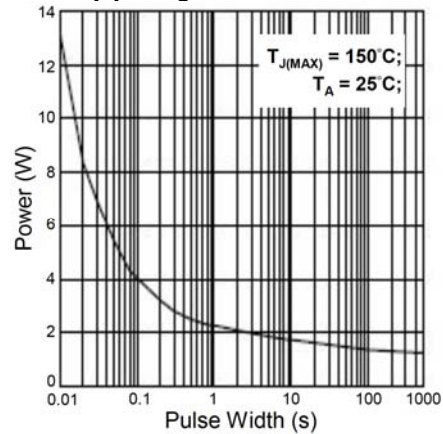
(7). Capacitance Characteristics



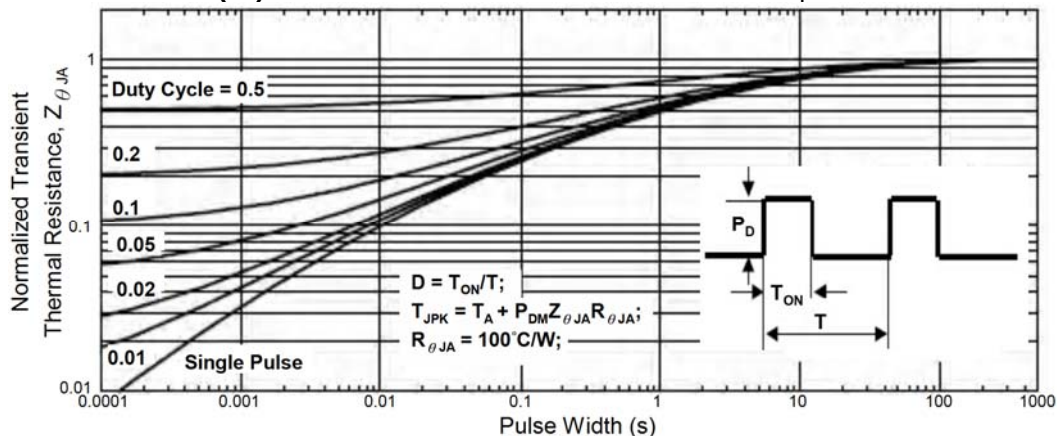
(8). Gate Charge



(9). Single Pulse Power



(10). Normalized Maximum Transient Thermal Impedance



PHYSICAL DIMENSION

Unit : Inch (Millimeter)

