

# STP3415



-20V P-Channel Enhancement Mode MOSFET

## DESCRIPTION

The STP3415 is the P-Channel logic enhancement mode power field effect transistor is produced using high cell density, advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltage as 1.5V

This device is suitable for use as a load switch or in applications.

STP3415S-TRG ROHS Compliant This is Halogen Free

ESD Protected : 3KV

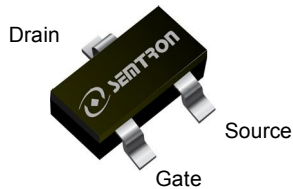
## FEATURE

- ◆ -20V/-4.0A,  $R_{DS(ON)} = 45m\Omega(typ.) @ V_{GS} = -4.5V$
- ◆ -20V/-4.0A,  $R_{DS(ON)} = 54m\Omega(typ.) @ V_{GS} = -2.5V$
- ◆ -20V/-2.0A,  $R_{DS(ON)} = 68m\Omega(typ.) @ V_{GS} = -1.8V$
- ◆ -20V/-1.0A,  $R_{DS(ON)} = 92m\Omega(typ.) @ V_{GS} = -1.5V$
- ◆ Super high density cell design for extremely low  $R_{DS(ON)}$
- ◆ Exceptional on-resistance and Maximum DC current capability

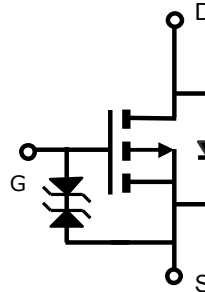
## APPLICATIONS

- ◆ Cellular/Portable
- ◆ Load Switch

## PIN CONFIGURATION



SOT-23L  
Top View



## PART NUMBER INFORMATION

ST P 3415 E S - TR G  
a b c d e f g

a : Company name.  
b : Channel type.  
c : Product Serial number.  
d : ESD (Blank for product without ESD).  
e : Package Code  
f : Handling Code

g : Lead Plating Code  
G : Lead-free product.

***This product is Halogen Free***

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## ORDERING INFORMATION

Part Number	Package Code	Handling Code	Shipping
STP3415ES-TRG	S : SOT-23L	TR : Tape&Reel	3K/Reel

※ Year Code : 0 ~ 9, 2010 : 0

※ Week Code : A(1~2) ~ Z(53~54)

※ SOT-23L : Only available in tape and reel packaging.

## ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ Unless otherwise noted)

Symbol	Parameter	Typical	Unit	
$V_{DSS}$	Drain-Source Voltage	-20	V	
$V_{GSS}$	Gate-Source Voltage	$\pm 8$	V	
$I_D$	Continuous Drain Current ( $T_C=25^\circ\text{C}$ ) <sup>A</sup>	$V_{GS}=-8\text{V}$	-4.0	A
	Continuous Drain Current ( $T_C=70^\circ\text{C}$ ) <sup>A</sup>		-3.5	A
$I_{DM}$	Pulsed Drain Current <sup>B</sup>	-20	A	
$P_D$	Power Dissipation	$T_A=25^\circ\text{C}$	1.5	W
		$T_A=70^\circ\text{C}$	0.9	
$T_J$	Operation Junction Temperature	-55 to 150	$^\circ\text{C}$	
$T_{STG}$	Storage Temperature Range	-55 to 150	$^\circ\text{C}$	

Note: 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.

## THERMAL DATA

Symbol	Parameter	Typ	Max	Unit	
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	Steady-State	-	140	$^\circ\text{C}/\text{W}$
$R_{\theta JL}$	Thermal Resistance Junction to Lead	Steady-State	-	80	$^\circ\text{C}/\text{W}$

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## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ Unless otherwise noted)

Symbol	Parameter	Condition	Min	Typ	Max	Unit
<b>Static Parameters</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=-250\mu A$	-20			V
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.3		-1.0	V
$I_{GSS}$	Gate Leakage Current	$V_{DS}=0V, V_{GS}=\pm 8V$			$\pm 10$	$\mu A$
$I_{DSS}$	Zero Gate Voltage, Drain-Source Leakage Current	$V_{DS}=-20V, V_{GS}=0V$ $T_J=25^\circ\text{C}$			-1	$\mu A$
		$V_{DS}=-20V, V_{GS}=0V$ $T_J=55^\circ\text{C}$			-5	
$R_{DS(ON)}$	Drain-source On-Resistance <sup>B</sup>	$V_{GS}=-4.5V, I_D=-4.0A$		44	54	m $\Omega$
		$V_{GS}=-2.5V, I_D=-4.0A$		53	62	
		$V_{GS}=-1.8V, I_D=-2.0A$		66	75	
		$V_{GS}=-1.5V, I_D=-1.0A$		85	110	
$G_{fs}$	Forward Transconductance	$V_{DS}=-5V, I_D=-4.0A$		22		S
<b>Source-Drain Diode</b>						
$V_{SD}$	Diode Forward Voltage	$I_S=-1.0A, V_{GS}=0V$		-0.67	-1.0	V
$I_S$	Continuous Source Current <sup>AD</sup>				-6	A
<b>Dynamic Parameters</b>						
$Q_g (-4.5V)$	Total Gate Charge	$V_{DS}=-10V$ $V_{GS}=-4.5V$ $I_D=-4.0A$		11.1		nC
$Q_{gs}$	Gate-Source Charge			3.1		
$Q_{gd}$	Gate-Drain Charge			2.4		
$C_{iss}$	Input Capacitance	$V_{DS}=-10V$ $V_{GS}=0V$ $f=1\text{MHz}$		989		pF
$C_{oss}$	Output Capacitance			167		
$C_{rss}$	Reverse Transfer Capacitance			75.5		
$t_{d(on)}$	Turn-On Time	$V_{DD}=-10V$ $I_D=-1A$		712		nS
$t_r$				1386		
$t_{d(off)}$	Turn-Off Time	$V_{GEN}=-4.5V$ $R_G=2.5\Omega$		9.1		$\mu A$
$t_f$				4		

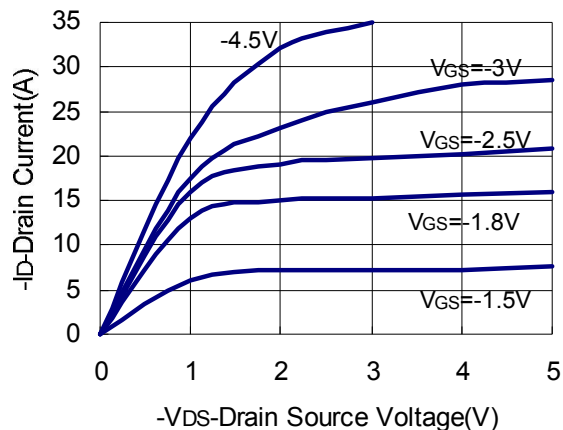
Note:

- The value of  $R_{\theta JA}$  is measured with the device mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ\text{C}$ .
- The data tested by pulsed, pulse width  $\leq 300\mu\text{s}$ , duty cycle  $\leq 2\%$
- The EAS data shows Max. rating. The test condition is  $V_{DD}=-25V, V_{GS}=-10V, L=0.1\text{mH}$ .
- The data is theoretically the same as  $I_D$  and  $I_{DM}$ , in real applications, should be limited by total power dissipation.

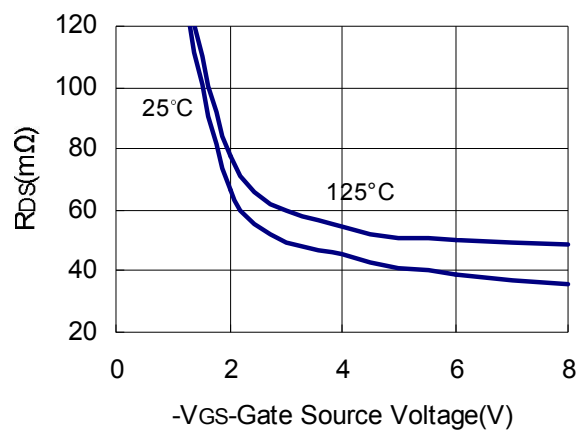
# STP3415

## TYPICAL CHARACTERISTICS (25°C Unless Note)

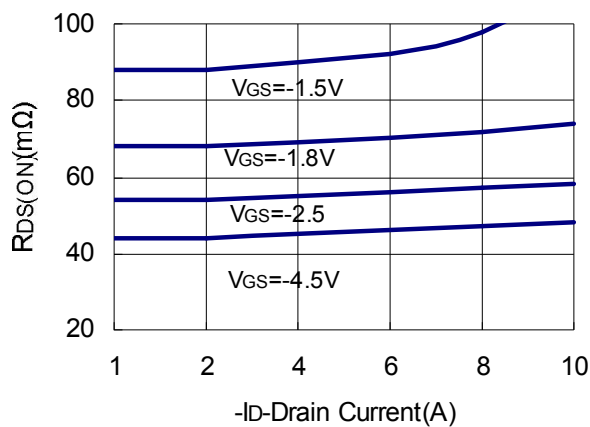
Output Characteristics



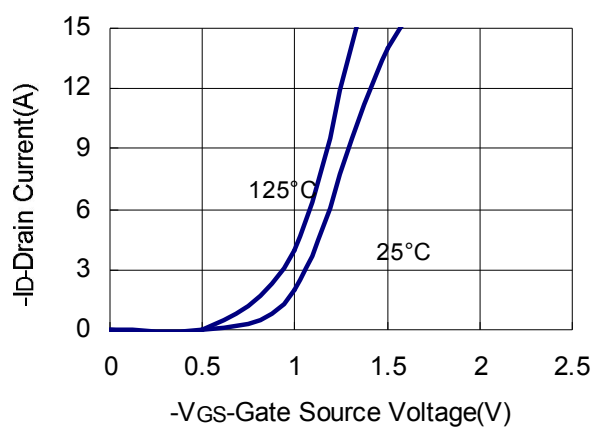
Drain-Source On Resistance



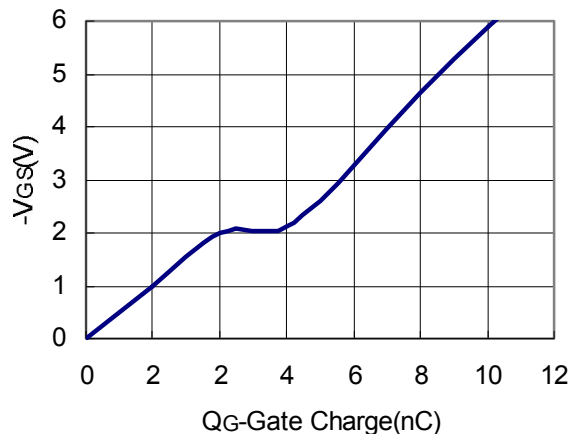
Drain Source On Resistance



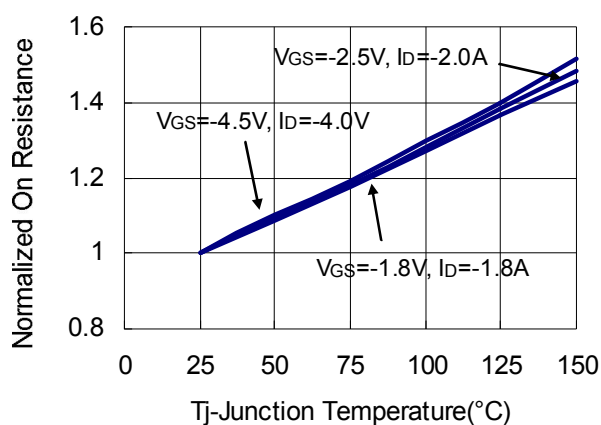
Transfer Characteristics



Gate Charge

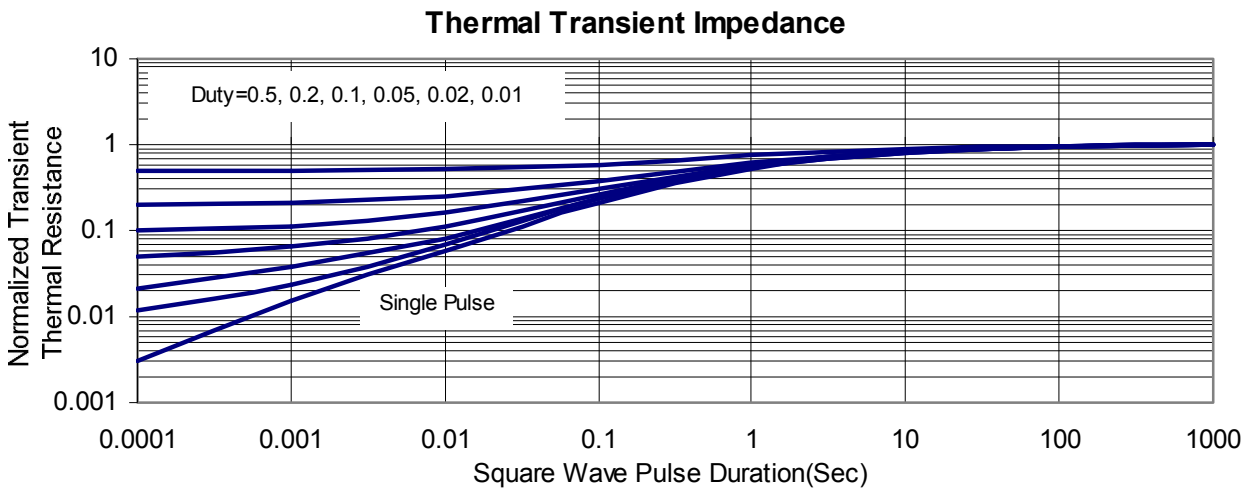
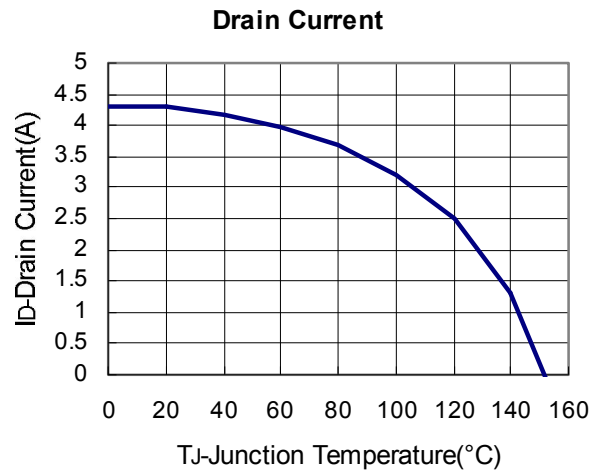
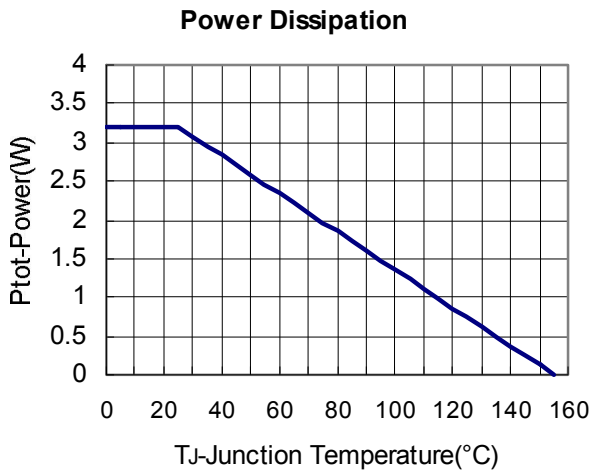
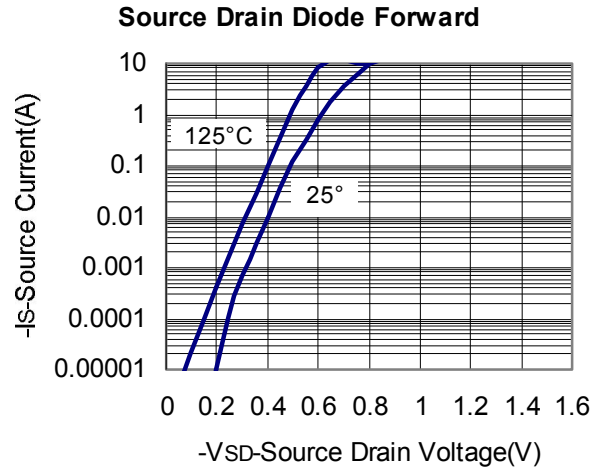
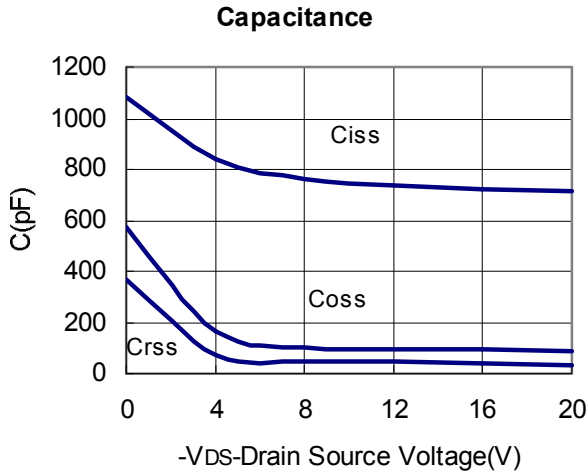


Drain Source Resistance



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## TYPICAL CHARACTERISTICS (25°C Unless Note)



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## ■ SOT-23L PACKAGE DIMENSIONS

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950 BSC		0.037 BSC	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
$\theta$	0°	8°	0°	8°

SOT-23L PACKAGE OUTLINE DIMENSIONS

