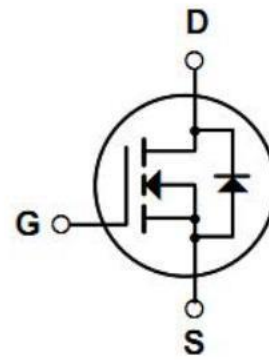


## Description

This N-Channel MOSFET uses advanced trench technology and design to provide excellent  $R_{DS(on)}$  with low gate charge. It can be used in a wide variety of applications.

## Features

- 1)  $V_{DS}=30V, I_D=5.8A, R_{DS(ON)}<41m\Omega @V_{GS}=10V. R_{DS(ON)}<45m\Omega @V_{GS}=4.5V. R_{DS(ON)}<59m\Omega @V_{GS}=2.5V.$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra  $R_{DS(ON)}$ .
- 5) Excellent package for good heat dissipation.



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

Symbol	Parameter	Ratings	Units
$V_{DS}$	Drain-Source Voltage	30	V
$V_{GS}$	Gate-Source Voltage	$\pm 12$	V
$I_D$	Continuous Drain Current-	5.8	A
	Continuous Drain Current- $T_c=100^\circ\text{C}$	-	
	Pulsed Drain Current <sup>1</sup>	-	
$E_{AS}$	Single Pulse Avalanche Energy	--	mJ
$P_D$	Power Dissipation	1.4	W
$T_J, T_{STG}$	Operating and Storage Junction Temperature Range	-55 to +150	$^\circ\text{C}$

## Thermal Characteristics

Symbol	Parameter	Ratings	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	-	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	89	

## Package Marking and Ordering Information

Part NO.	Marking	Package
RYN30A6S	30A6S	SOT-23

## Electrical Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Units
<b>Off Characteristics</b>						
$BV_{DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	30	33		V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=30V$	-	-	1	$\mu\text{A}$
$I_{GSS}$	Gate-Source Leakage Current	$V_{GS}=\pm 12V, V_{DS}=0A$	-	-	$\pm 100$	nA
<b>On Characteristics<sup>3</sup></b>						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	0.7	0.9	1.4	V
$R_{DS(ON)}$	Drain-Source On Resistance	$V_{GS}=10V, I_D=5.8A$	-	28	41	m $\Omega$
		$V_{GS}=4.5V, I_D=5A$	-	31	45	
$G_{FS}$	Forward Transconductance	$V_{DS}=5V, I_D=5A$	10	---	-	S
<b>Dynamic Characteristics<sup>4</sup></b>						
$C_{iss}$	Input Capacitance	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$	-	820	---	pF
$C_{oss}$	Output Capacitance		-	99	-	
$C_{rss}$	Reverse Transfer Capacitance		-	77	--	
$R_g$	Gate Resistance	$f=1\text{MHz}$	-	-	-	$\Omega$
<b>Switching Characteristics<sup>4</sup></b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=15V, I_D=2.7A$ $V_{GS}=10V, R_{GEN}=3\ \Omega$	-	3.3	--	ns
$t_r$	Rise Time		-	4.8	---	ns
$t_{d(off)}$	Turn-Off Delay Time		-	26	---	ns
$t_f$	Fall Time		-	4	---	ns
$Q_g$	Total Gate Charge	$V_{GS}=4.5V, V_{DS}=15V,$ $I_D=5.8A$	-	9.5	-	nC
$Q_{gs}$	Gate-Source Charge		-	15	-	nC
$Q_{gd}$	Gate-Drain "Miller" Charge		-	3	-	nC
<b>Drain-Source Diode Characteristics</b>						
$V_{SD}$	Source-Drain Diode Forward Voltage <sup>3</sup>	$V_{GS}=0V, I_S=5.8A$	-	--	1.2	V
$t_{rr}$	Reverse Recovery Time	$I_F=15A, di/dt=10A/\ \mu\text{S}$	-	-	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	-	-	nC

### Notes:

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  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design, not subject to production

## Typical Electrical and Thermal Characteristics

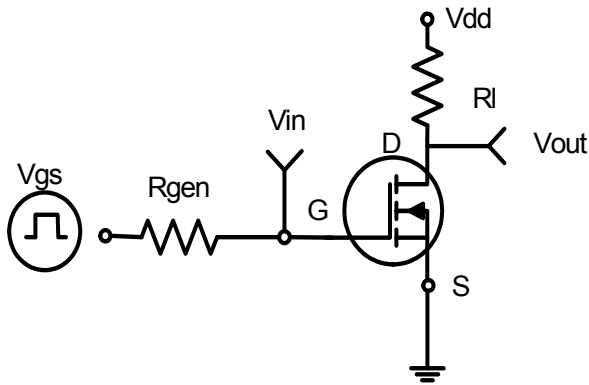


Figure 1: Switching Test Circuit

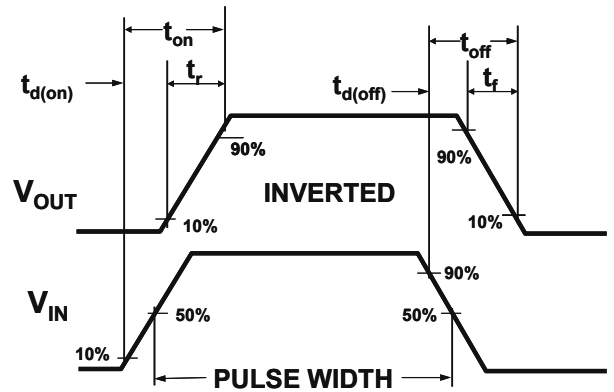
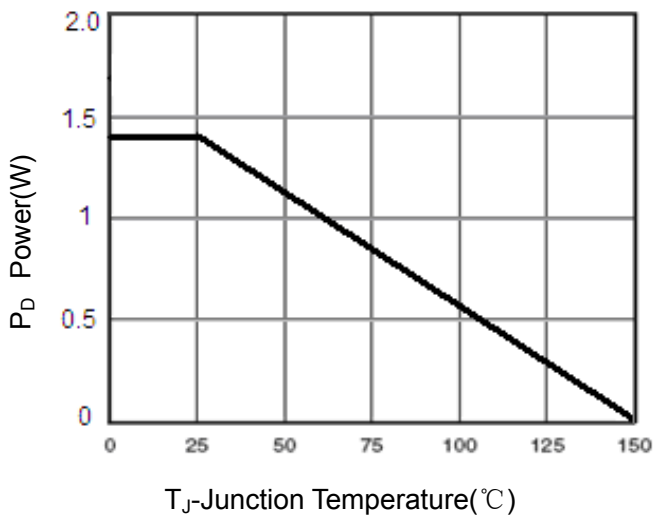
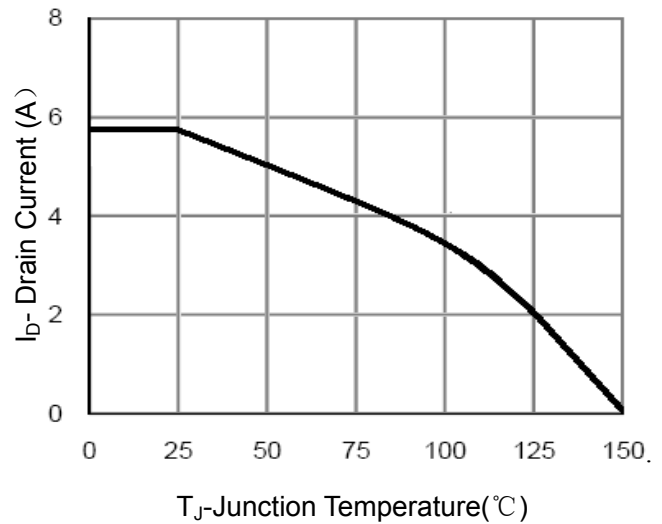


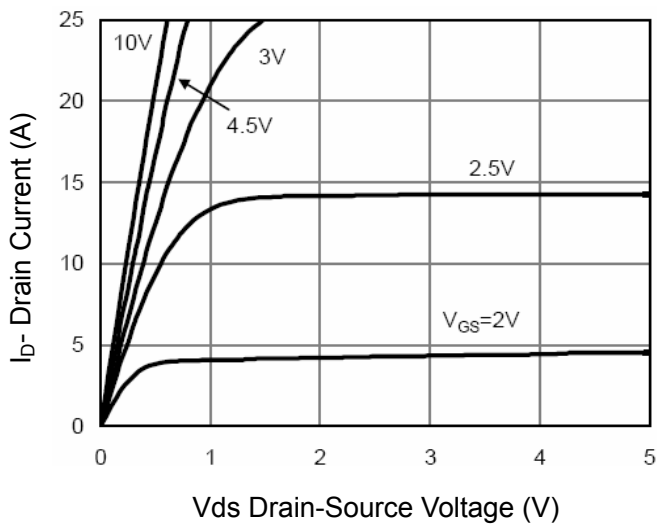
Figure 2: Switching Waveforms



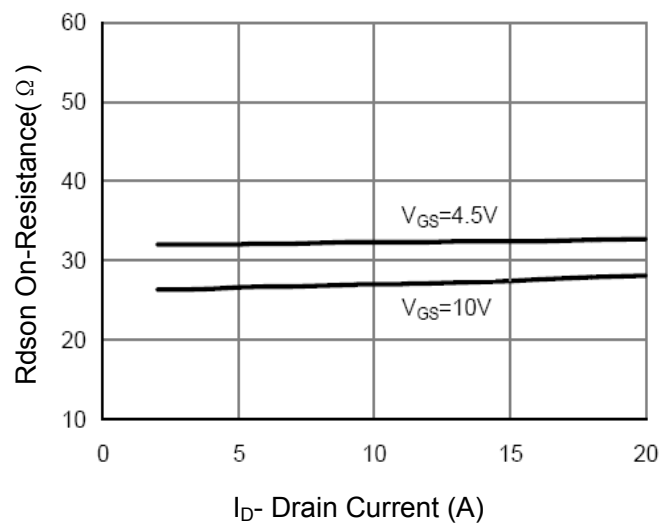
T<sub>J</sub>-Junction Temperature(°C)  
Figure 3 Power Dissipation



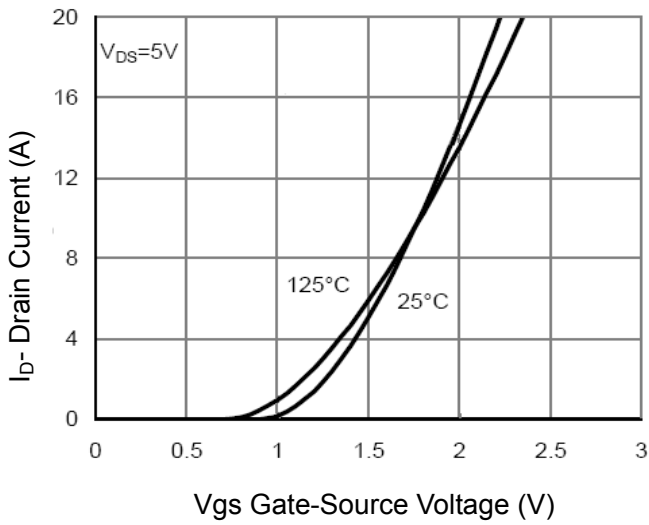
T<sub>J</sub>-Junction Temperature(°C)  
Figure 4 Drain Current



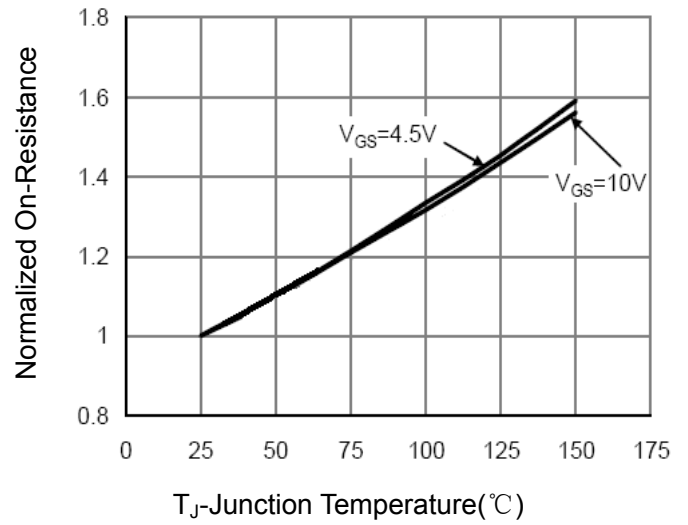
V<sub>ds</sub> Drain-Source Voltage (V)  
Figure 5 Output Characteristics



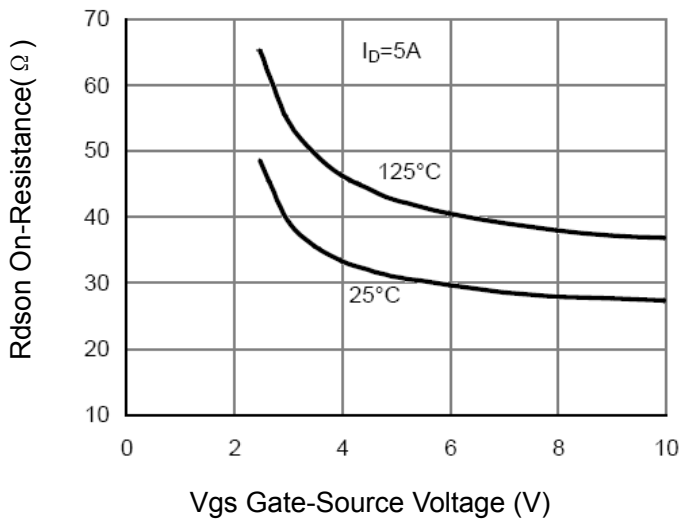
I<sub>D</sub>- Drain Current (A)  
Figure 6 Drain-Source On-Resistance



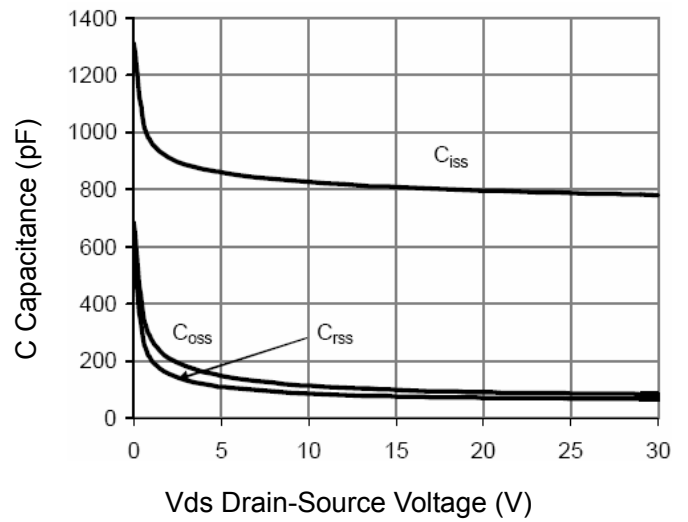
**Figure 7 Transfer Characteristics**



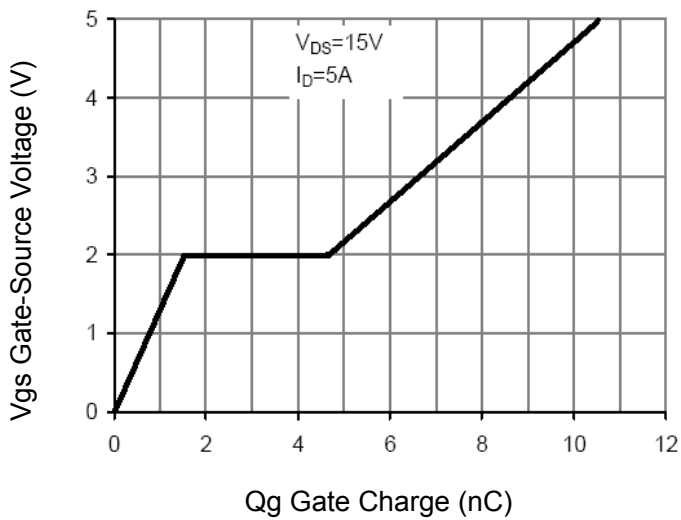
**Figure 8 Drain-Source On-Resistance**



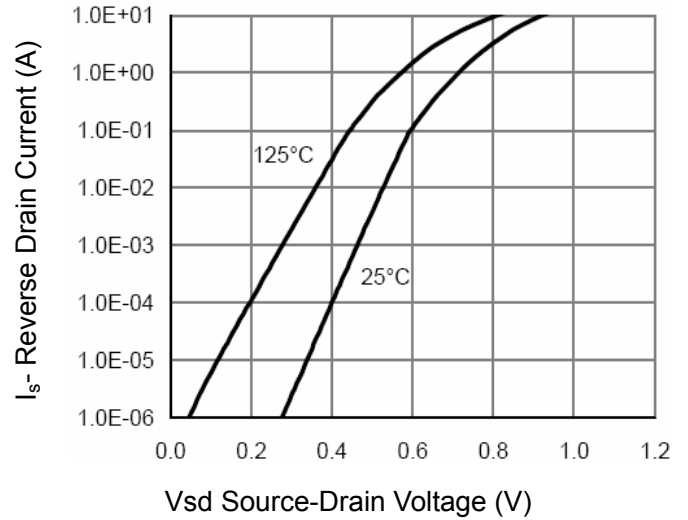
**Figure 9 Rdson vs Vgs**



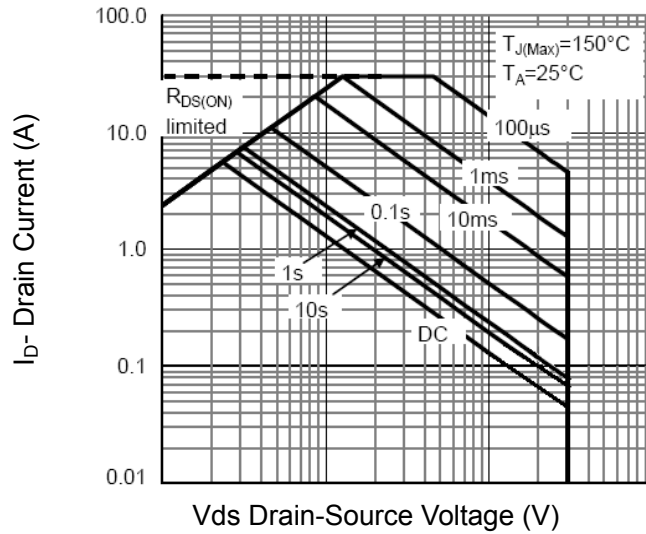
**Figure 10 Capacitance vs Vds**



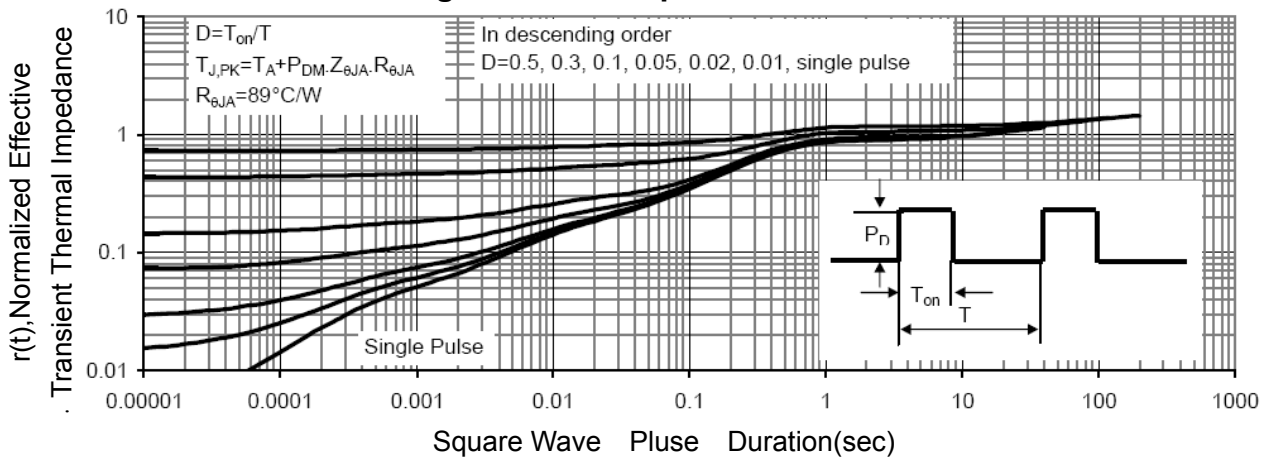
**Figure 11 Gate Charge**



**Figure 12 Source- Drain Diode Forward**



**Figure 13 Safe Operation Area**



**Figure 14 Normalized Maximum Transient Thermal Impedance**