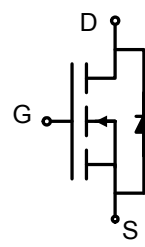
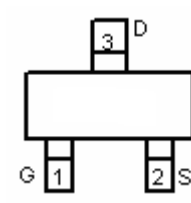



# N-Channel Enhancement Mode Power MOSFET

## RC2304A

<p><b>Description</b></p> <p>The RC2304A uses advanced trench technology to provide excellent <math>R_{DS(ON)}</math> and low gate charge. This device is suitable for use as a load switch or in PWM applications.</p> <p><b>General Features</b></p> <ul style="list-style-type: none"> <li>● <math>V_{DS} = 30V, I_D = 3.6A</math></li> <li style="padding-left: 20px;"><math>R_{DS(ON)} &lt; 60m\Omega @ V_{GS}=4.5V</math></li> <li style="padding-left: 20px;"><math>R_{DS(ON)} &lt; 40m\Omega @ V_{GS}=10V</math></li> <li>● High power and current handling capability</li> <li>● Lead free product is acquired</li> <li>● Surface mount package</li> </ul> <p><b>Application</b></p> <ul style="list-style-type: none"> <li>● Battery protection</li> <li>● Load switch</li> <li>● Power management</li> </ul>	<div style="text-align: center;">  <p><b>Schematic diagram</b></p> </div> <div style="text-align: center;">  <p><b>Marking and pin assignment</b></p> </div> <div style="text-align: center;">  <p><b>SOT-23</b></p> </div>
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### Absolute Maximum Ratings ( $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current-Continuous	$I_D$	3.6	A
Drain Current-Pulsed (Note 1)	$I_{DM}$	15	A
Maximum Power Dissipation	$P_D$	1.7	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	73.5	$^\circ C/W$
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### Electrical Characteristics ( $T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30	33	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu A$

# N-Channel Enhancement Mode Power MOSFET

## RC2304A

Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	$\pm 100$	nA
<b>On Characteristics (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	1.5	2.2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=3.1A$	-	40	60	m $\Omega$
		$V_{GS}=10V, I_D=3.6A$	-	35	40	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=3.6A$	-	11	-	S
<b>Dynamic Characteristics (Note4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	230	-	PF
Output Capacitance	$C_{oss}$		-	40	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	17	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=3.6A$ $V_{GS}=4.5V, R_{GEN}=6\Omega$	-	10	-	nS
Turn-on Rise Time	$t_r$		-	50	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	10	-	nS
Turn-Off Fall Time	$t_f$		-	20	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=15V, I_D=3.6A,$ $V_{GS}=10V$	-	4.0	-	nC
Gate-Source Charge	$Q_{gs}$		-	0.75	-	nC
Gate-Drain Charge	$Q_{gd}$		-	0.65	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=2.7A$	-	0.8	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	1.6	A

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

# N-Channel Enhancement Mode Power MOSFET RC2304A

## Typical Electrical and Thermal Characteristics

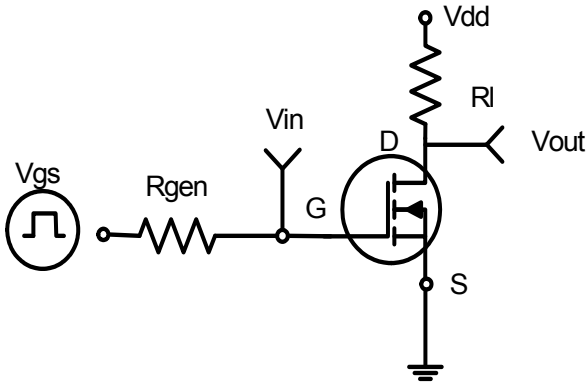


Figure 1: Switching Test Circuit

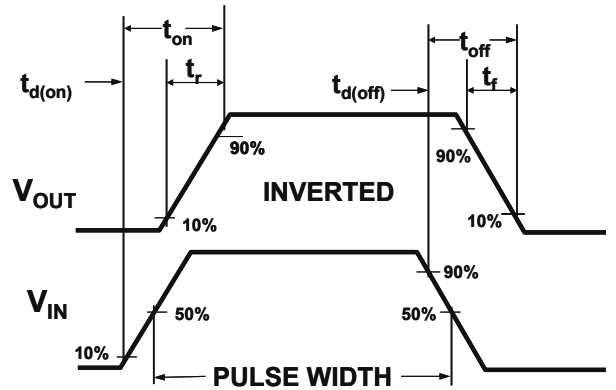
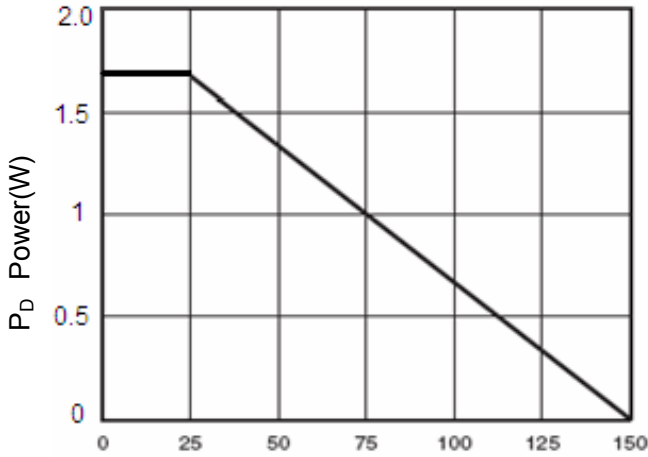
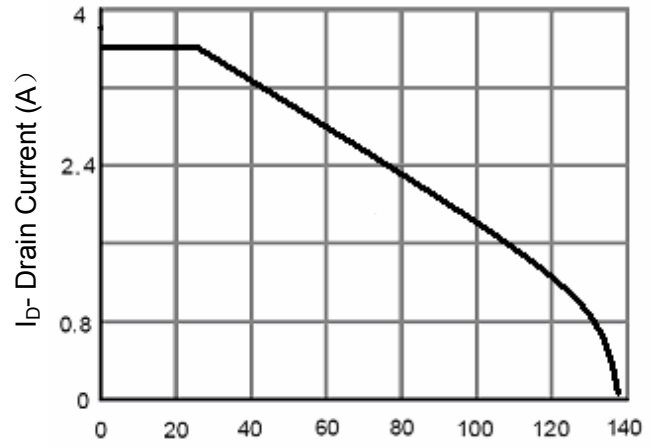


Figure 2: Switching Waveforms



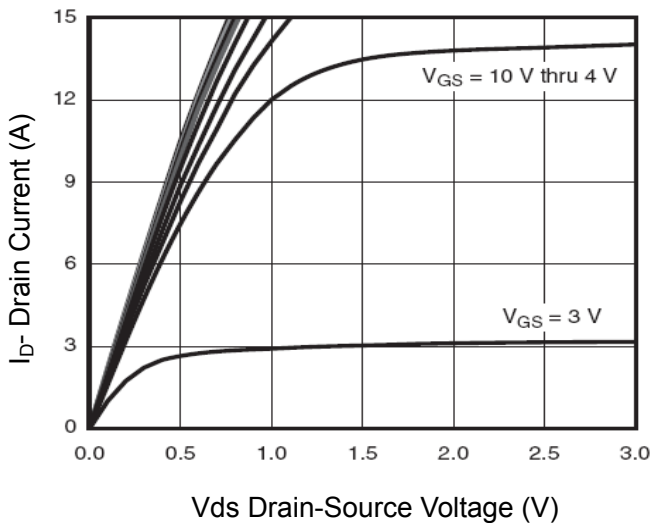
T<sub>J</sub>-Junction Temperature(°C)

Figure 3 Power Dissipation



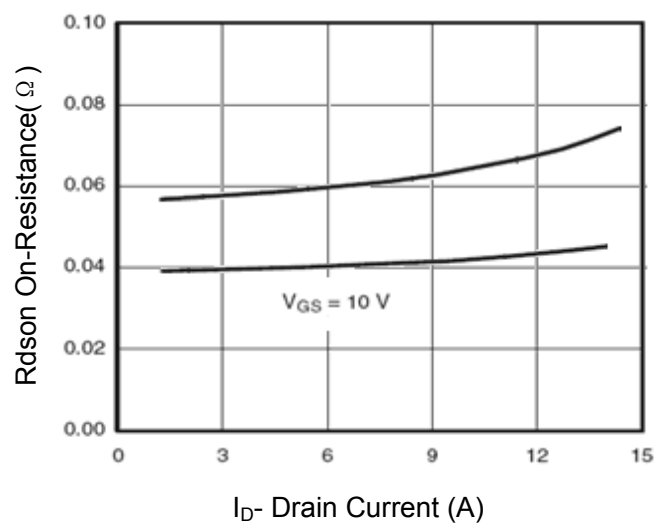
T<sub>J</sub>-Junction Temperature(°C)

Figure 4 Drain Current



V<sub>DS</sub> Drain-Source Voltage (V)

Figure 5 Output Characteristics

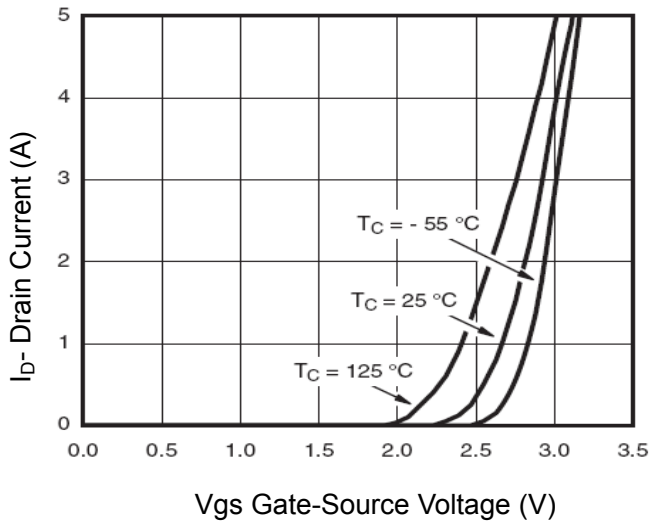


I<sub>D</sub>- Drain Current (A)

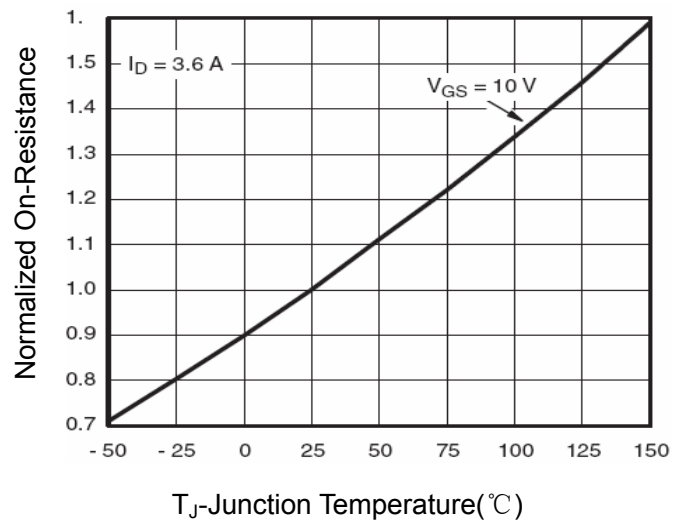
Figure 6 Drain-Source On-Resistance

# N-Channel Enhancement Mode Power MOSFET

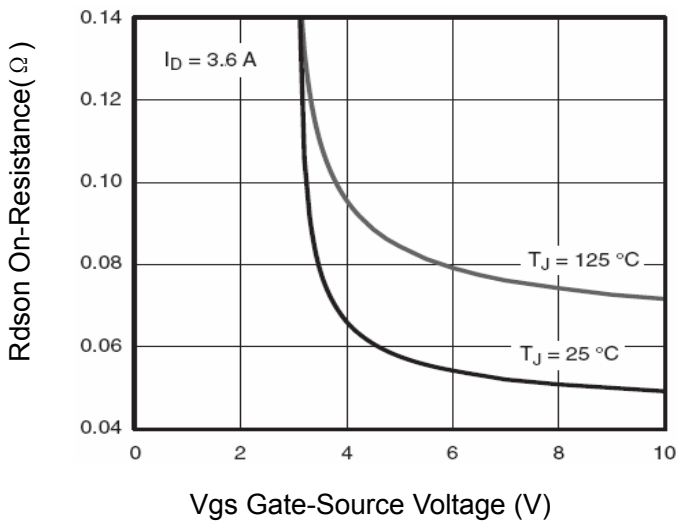
## RC2304A



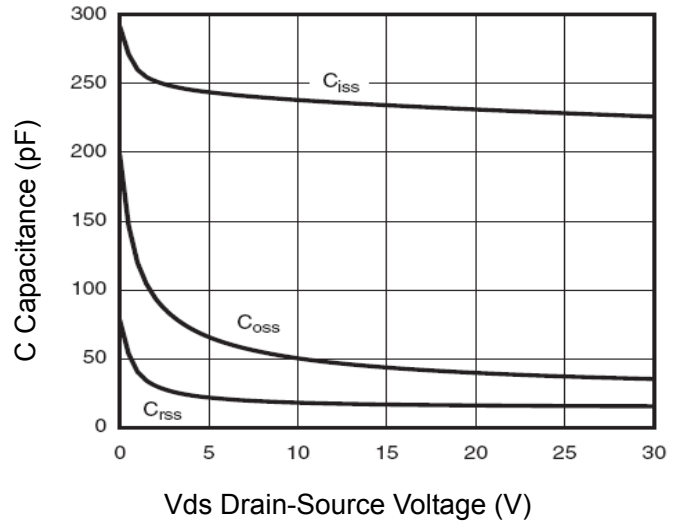
**Figure 7 Transfer Characteristics**



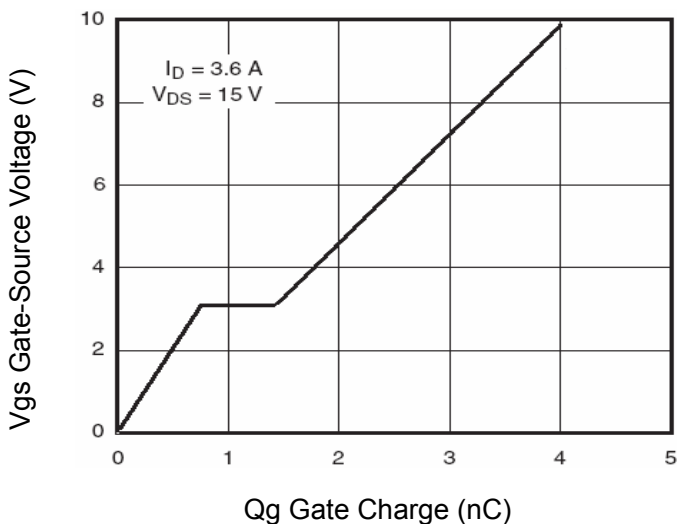
**Figure 8 Drain-Source On-Resistance**



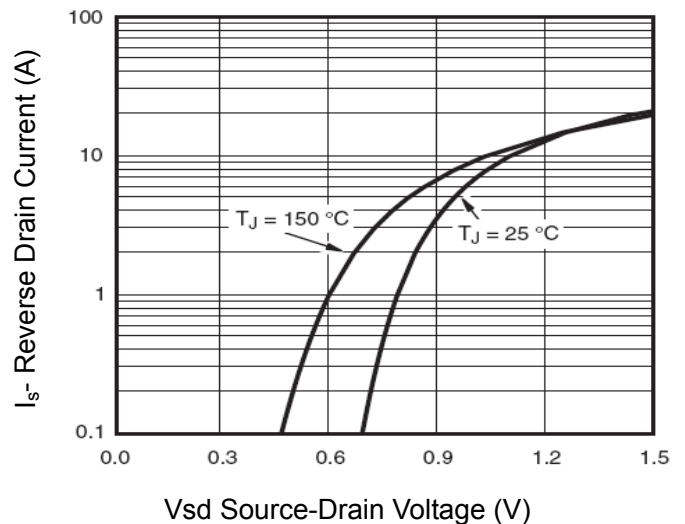
**Figure 9 Rdson vs Vgs**



**Figure 10 Capacitance vs Vds**



**Figure 11 Gate Charge**



**Figure 12 Source- Drain Diode Forward**

# N-Channel Enhancement Mode Power MOSFET RC2304A

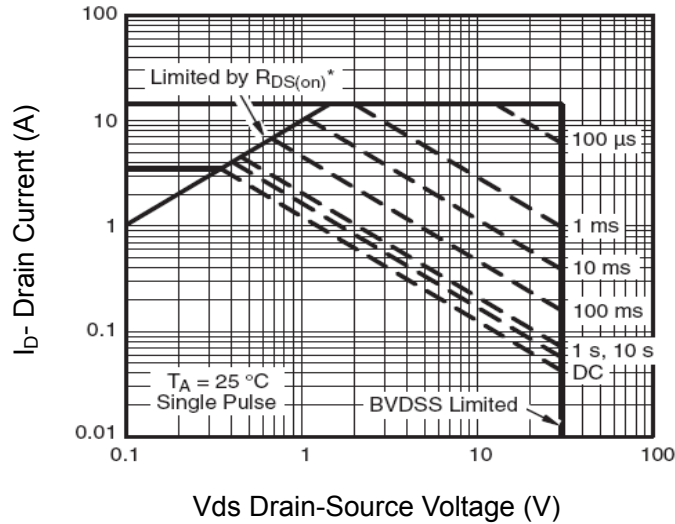


Figure 13 Safe Operation Area

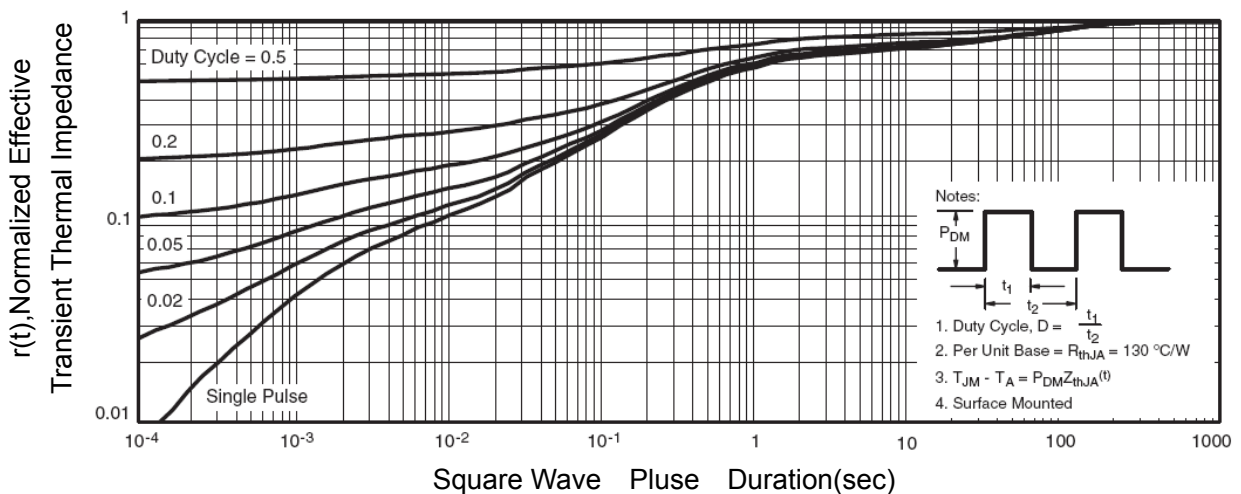


Figure 14 Normalized Maximum Transient Thermal Impedance