

## N-Channel Enhancement Mode Power MOSFET

### Description

The A04410 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.

### General Features

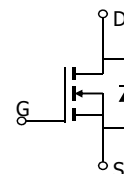
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Good stability and uniformity with high  $E_{AS}$
- Excellent package for good heat dissipation

### Application

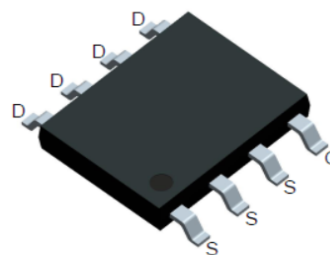
- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

**100% UIS TESTED!**

$V_{DSS}$	$R_{DS(ON)}$ Typ	$I_D$ Max
30V	8m $\Omega$ @ 10V	15A
	10m $\Omega$ @ 4.5V	



Schematic diagram



SOP-8 top view

### Package Marking and Ordering Information

Part ID	Package	Marking	Packing
A04410	SOP-8		3000PCS/Reel

### Absolute Maximum Ratings ( $T_C=25^{\circ}C$ 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	$I_D$	15	A
Drain Current-Continuous( $T_C=70^{\circ}C$ )	$I_D (70^{\circ}C)$	11	A
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	45	A
Maximum Power Dissipation	$P_D$	0.8	W
Single pulse avalanche energy <sup>(Note 5)</sup>	$E_{AS}$	35	mJ
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^{\circ}C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Case <sup>(Note 2)</sup>	$R_{\theta JC}$	4.5	$^{\circ}C/W$
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## Electrical Characteristics (TC=25°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	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$	-	-	1	$\mu A$
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	1.5	2.5	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=15A$	-	8	10	m $\Omega$
		$V_{GS}=4.5V, I_D=15A$	-	10	15	
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=20A$	30	-	-	S
<b>Dynamic Characteristics (Note4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	1007	-	PF
Output Capacitance	$C_{oss}$		-	128	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	117	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=5V, I_D=5A$ $V_{GS}=10V, R_{GEN}=3.3\Omega$	-	13	-	nS
Turn-on Rise Time	$t_r$		-	38	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	29	-	nS
Turn-Off Fall Time	$t_f$		-	8	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=15V, I_D=20A,$ $V_{GS}=10V$	-	23.1	-	nC
Gate-Source Charge	$Q_{gs}$		-	4.28	-	nC
Gate-Drain Charge	$Q_{gd}$		-	4.32	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=10A$	-	0.82	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	45	A
Reverse Recovery Time	$t_{rr}$	$V_{GS}=0V, I_{SD}=9A$ $di/dt=100A/\mu s$ (Note3)	-	-	25	nS
Reverse Recovery Charge	$Q_{rr}$		-	-	15	nC
Forward Turn-On Time	$t_{on}$	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes: ① Pulse width  $\leq 300\mu s$ ; duty cycles  $\leq 2\%$ .

Typical Characteristics

Typical Electrical and Thermal Characteristics

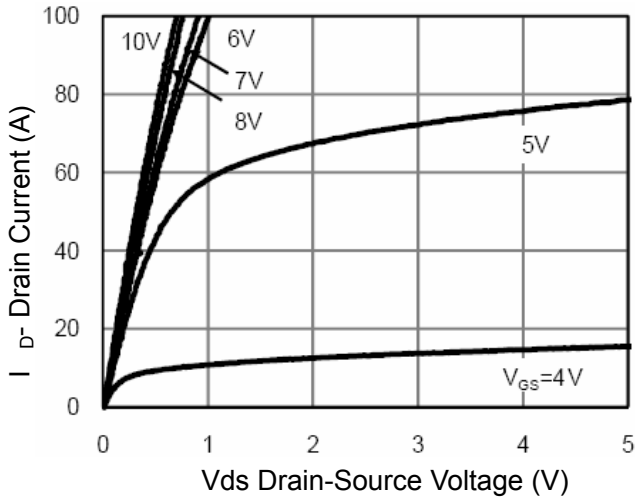


Figure 1 Output Characteristics

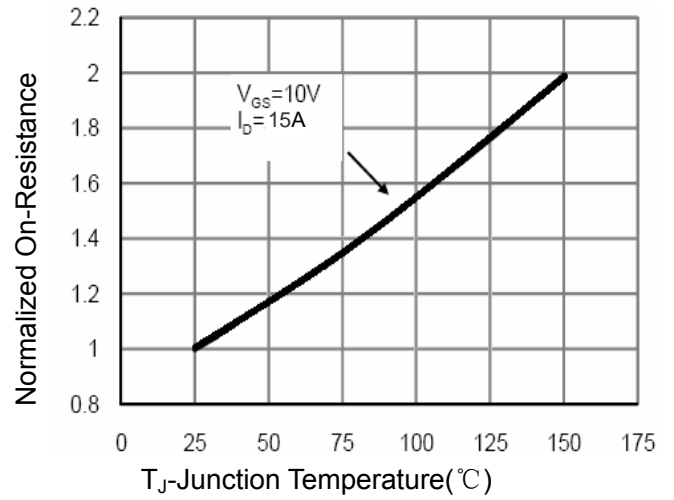


Figure 4 Rds(on)-Junction Temperature

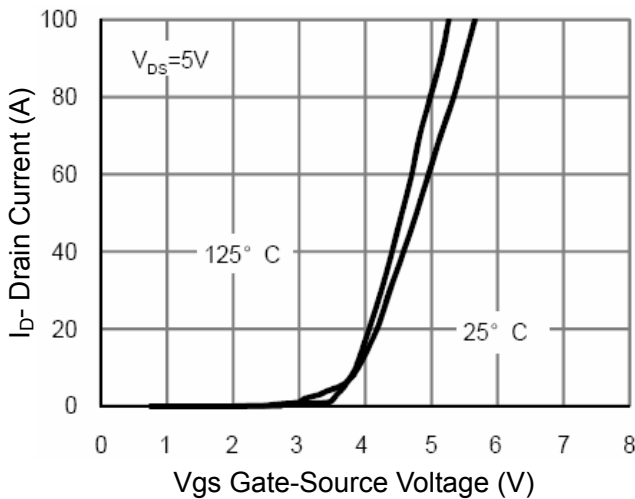


Figure 2 Transfer Characteristics

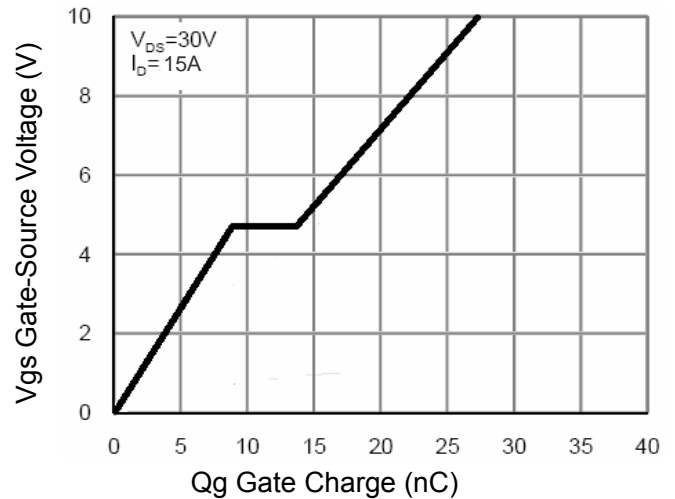


Figure 5 Gate Charge

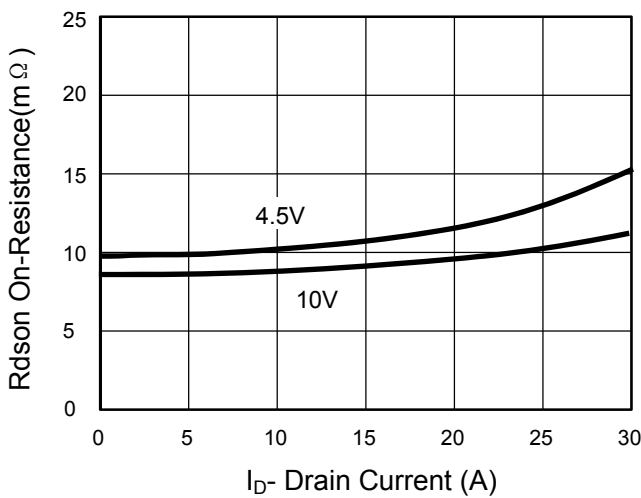


Figure 3 Rds(on)- Drain Current

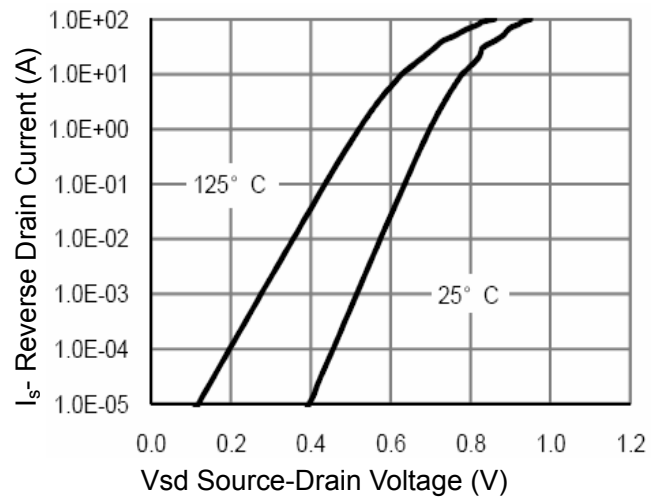
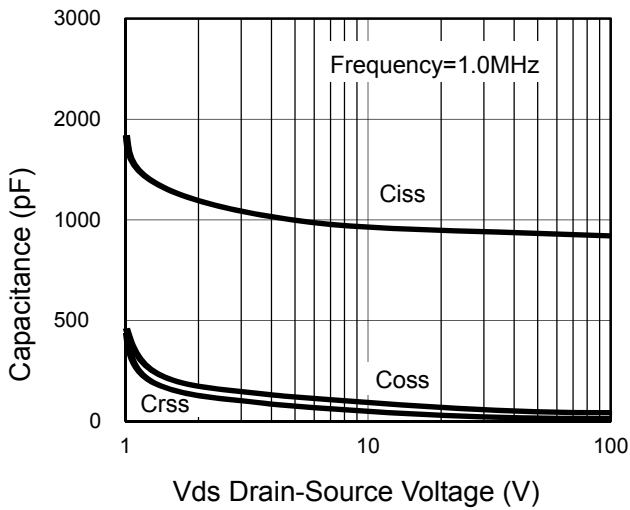
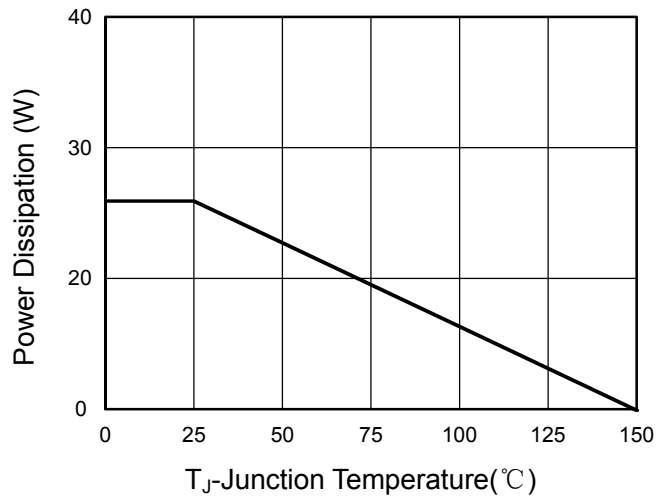


Figure 6 Source- Drain Diode Forward

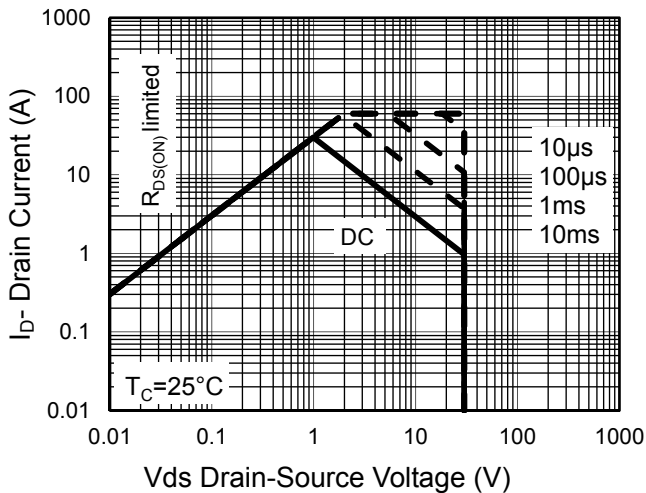
**Typical Characteristics**



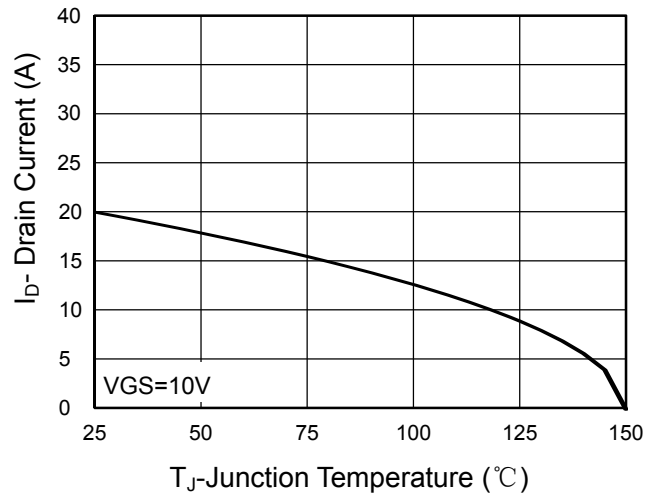
**Figure 7 Capacitance vs Vds**



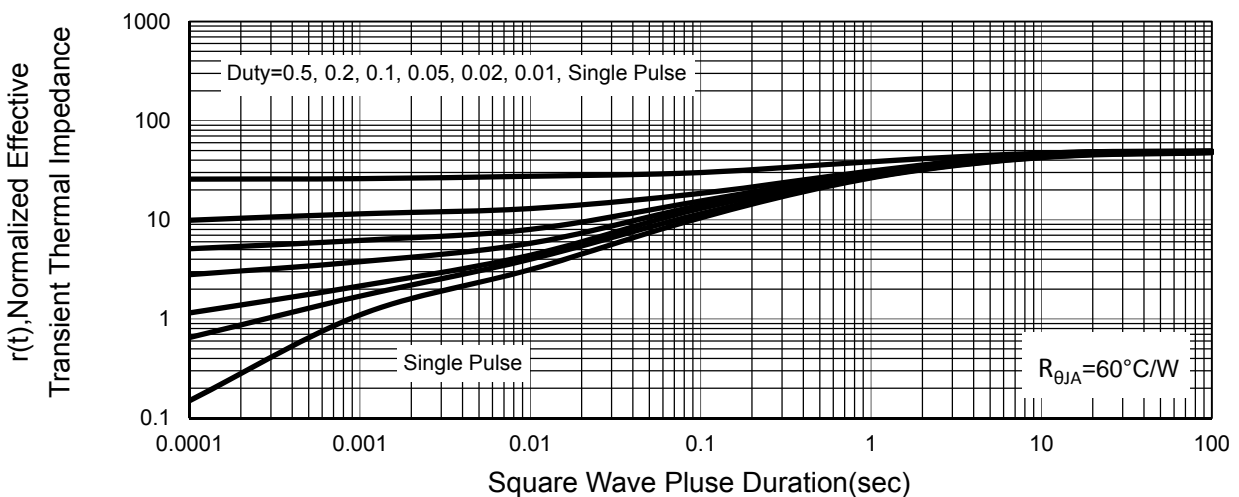
**Figure 9 Power De-rating**



**Figure 8 Safe Operation Area**

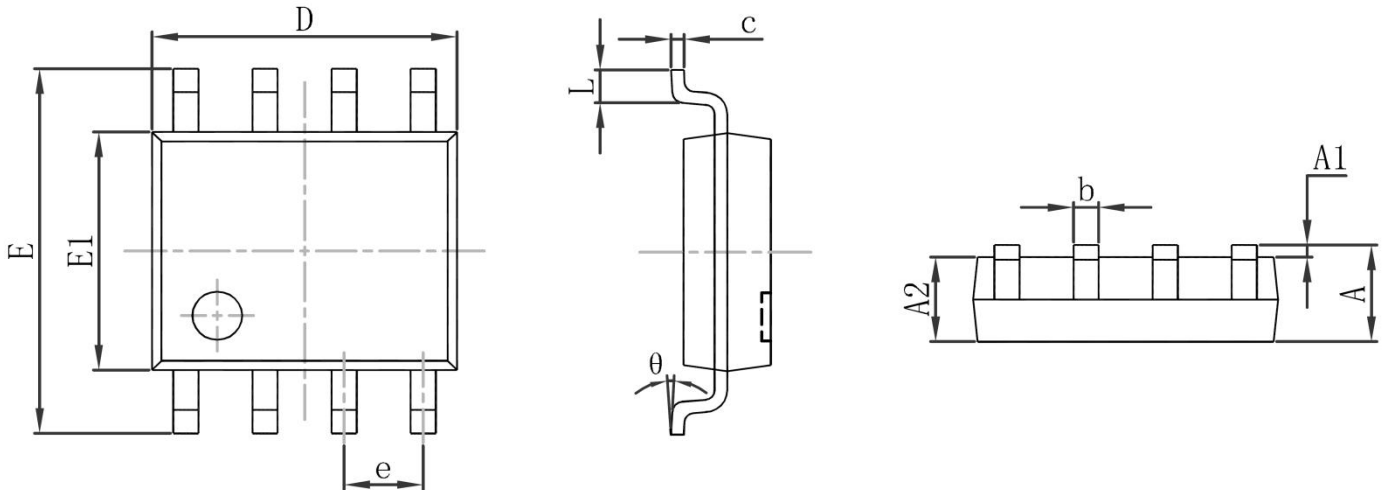


**Figure 10 Current De-rating**



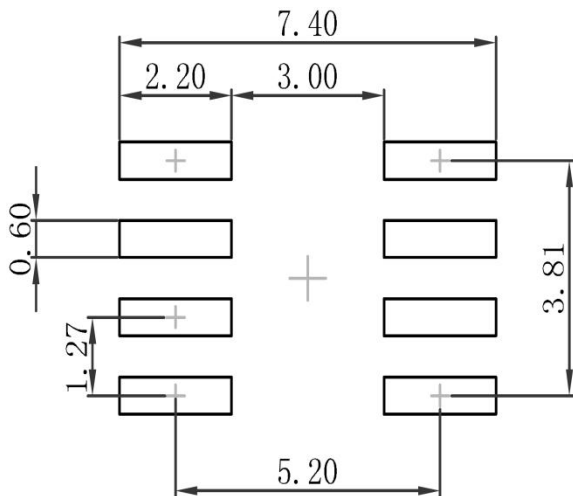
**Figure 11 Normalized Maximum Transient Thermal Impedance**

**SOP-8 Package Outline Dimensions**



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270(BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

**SOP-8 Suggested Pad Layout**



**Note:**

1. Controlling dimension: in millimeters
2. General tolerance: ±0.05mm
3. The pad layout is for reference purposes only