N-CHANNEL ENHANCEMENT MODE POWER MOSFET

● **General Description**

The 4410 combines advanced trench MOSFET technology with a low resistance package to provide extremely low RDS(ON). This device is ideal for load switch and battery protection applications.
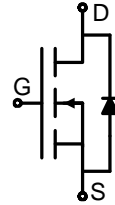
● **Features**

Advance high cell density Trench technology

Low RDS(ON) to minimize conductive loss

Low Gate Charge for fast switching

Dual DIE in one package

●**Application**

Power Management in Notebook Computer,

Portable Equipment and Battery

Powered Systems

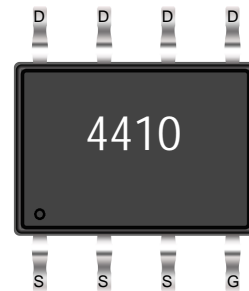● **Product Summary**

$V_{DS} = 30V \quad I_D = 15A$

$R_{DSON(10V\ typ)} = 8.3m\Omega$

$R_{DSON(4.5V\ typ)} = 10.0m\Omega$

RoHS compliant

4410

SOP-8

●**Package Marking and Ordering Information:**

Part NO.	4410
Basic ordering unit (pcs)	4000

●**Absolute Maximum Ratings** ($T_C = 25℃$)

Parameter	Symbol	Rating	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current	I_D@TC=25℃	15	A
	I_D@TC=75℃	11	A
	I_D@TC=100℃	9.0	A
Pulsed Drain Current [1]	I_{DM}	45	A
Total Power Dissipation	P_D@TC=25℃	35	W
Total Power Dissipation	P_D@TA=25℃	0.8	W
Operating Junction Temperature	T_J	-55 to 150	℃
Storage Temperature	T_{STG}	-55 to 150	℃
Single Pulse Avalanche Energy	E_{AS}	35	mJ

●Thermal resistance

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal resistance, junction - case	R_{thJC}	-	-	4.5	°C/W
Thermal resistance, junction - ambient	R_{thJA}	-	-	60	°C/W
Soldering temperature, wavesoldering for 8 s	T_{sold}	-	-	265	°C

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250uA$	30	-	-	V
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS}=V_{DS}, I_D=250uA$	1.2	1.5	2.5	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=30 V_{GS}=0V$	-	-	1.0	uA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm20V, V_{DS}=0V$	-	-	±100	nA
Static Drain-source On Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=15A$	-	8.3	10	mΩ
		$V_{GS}=4.5V, I_D=10A$	-	10	15	mΩ
Forward Transconductance	g_{FS}	$V_{DS}=25V, I_D=10A$	-	8	-	S
Source-drain voltage	V_{SD}	Is=10A	-	-	1.20	V

●Electronic Characteristics

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Input capacitance	Ciss		-	1007	-	
Output capacitance	Coss	f = 1MHz V_{DS}=15V	-	128.9	-	pF
Reverse transfer capacitance	Crss	V_{GS}=0V	-	117.7	-	

●Gate Charge characteristics(T_a = 25℃)

Parameter	Symbol	Condition	Min.	Typ	Max.	Unit
Total gate charge	Qg	V_{DD} = 15V	-	23.1	-	
Gate - Source charge	Qgs	I_D = 10A	-	4.28	-	nC
Gate - Drain charge	Qgd	V_{GS} = 10V	-	4.32	-	

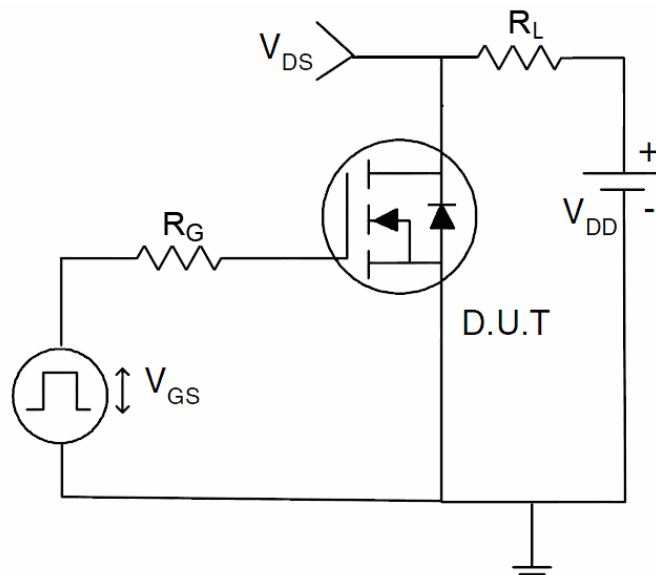Note: ① Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2% ;
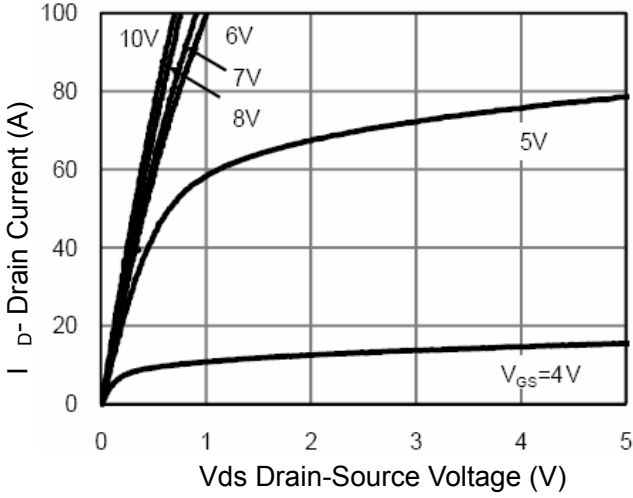
Test Circuit

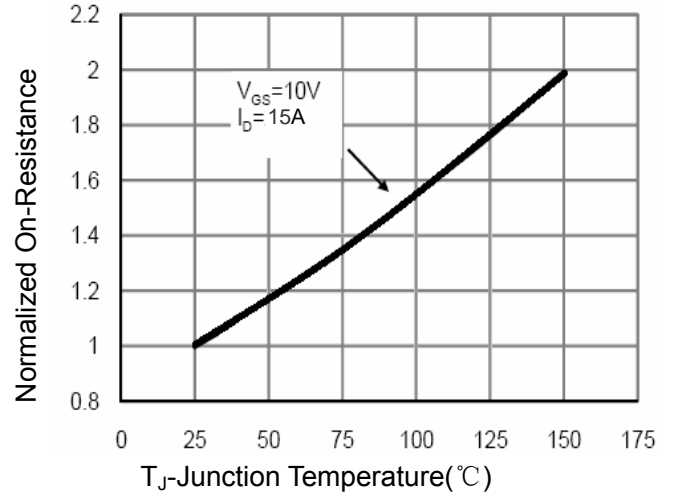### 1) E$_{AS}$ test Circuit
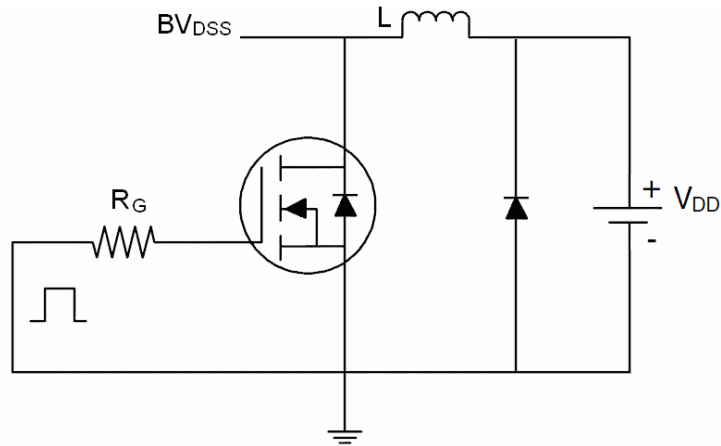
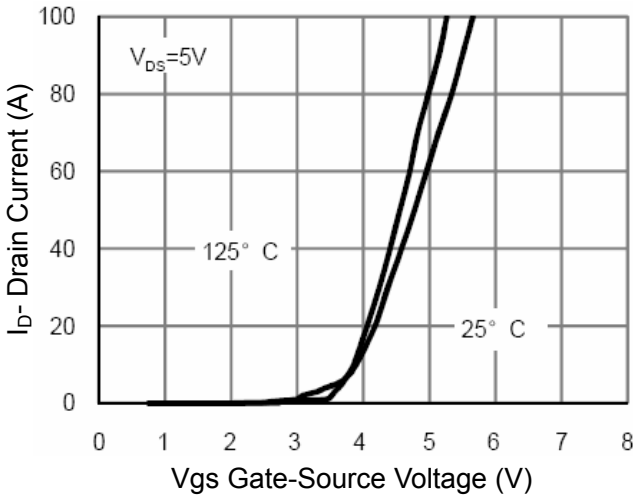### 2) Gate charge test Circuit
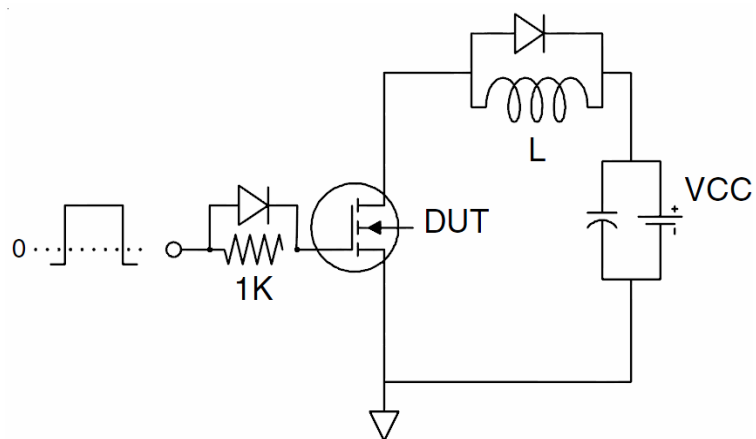
3) Switch Time Test Circuit
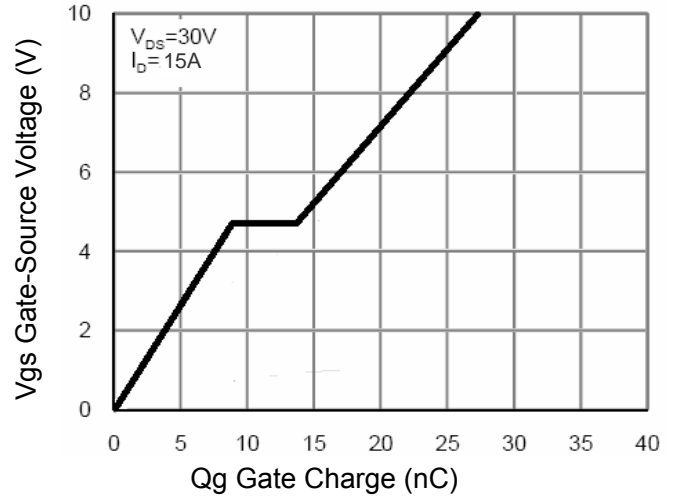
Typical Electrical and Thermal Characteristics

Figure 1 Output Characteristics

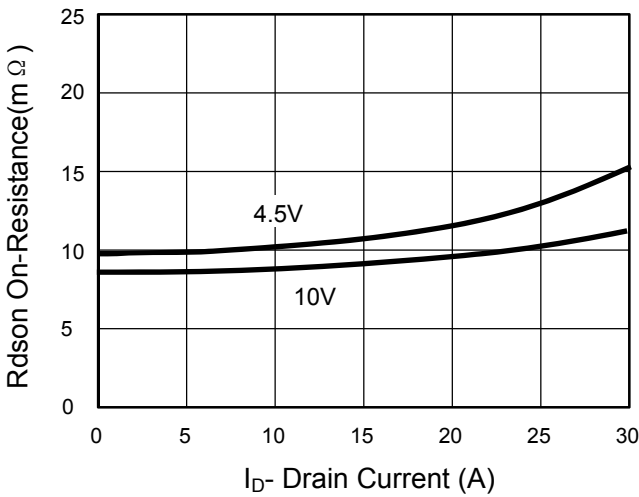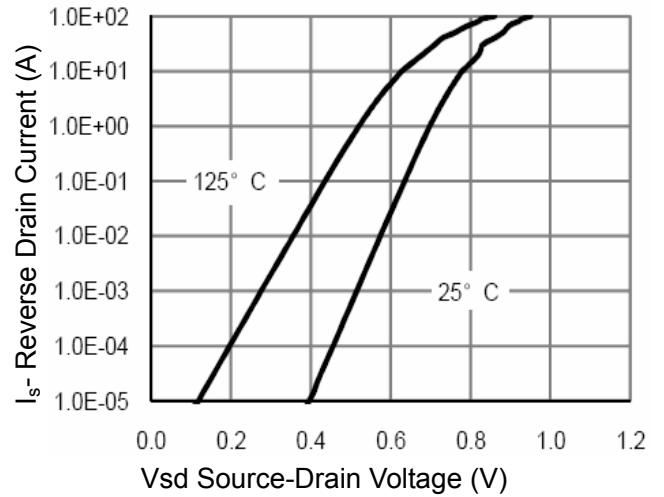

Figure 4 Rdson-JunctionTemperature

Figure 2 Transfer Characteristics

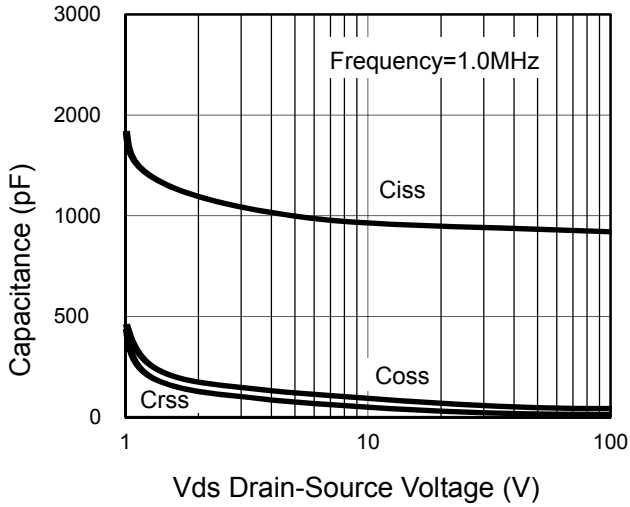
Figure 5 Gate Charge

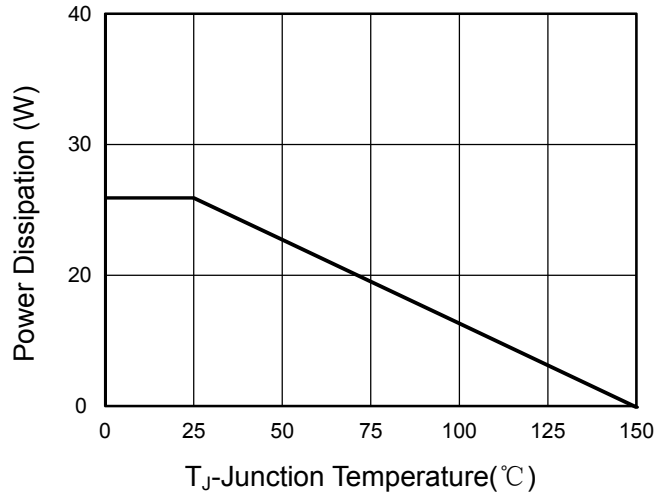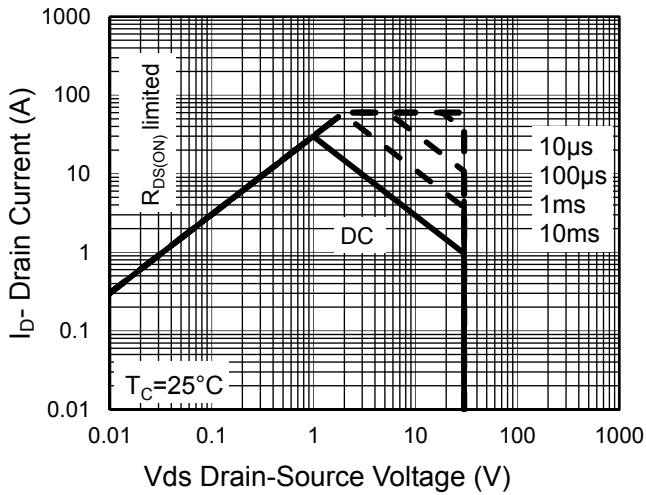

Figure 3 Rdson- Drain Current

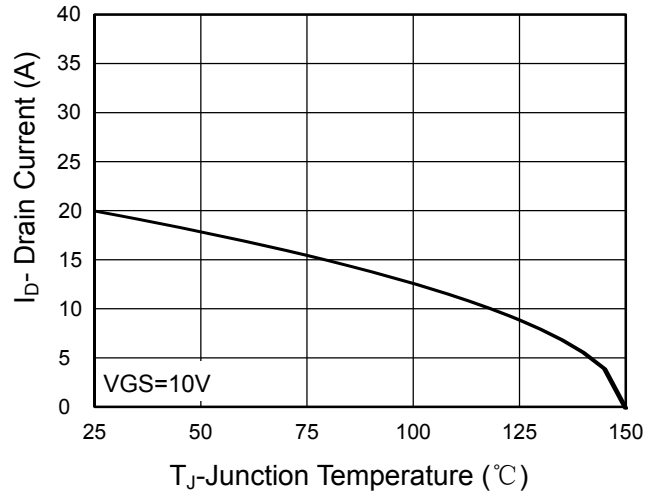**Figure 6 Source- Drain Diode Forward**
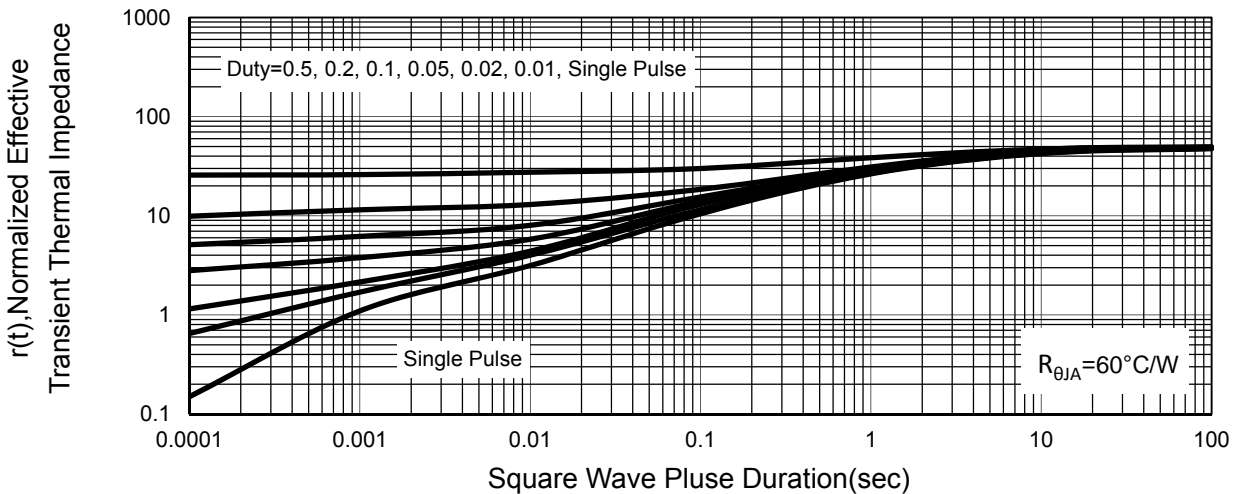
Figure 7 Capacitance vs Vds

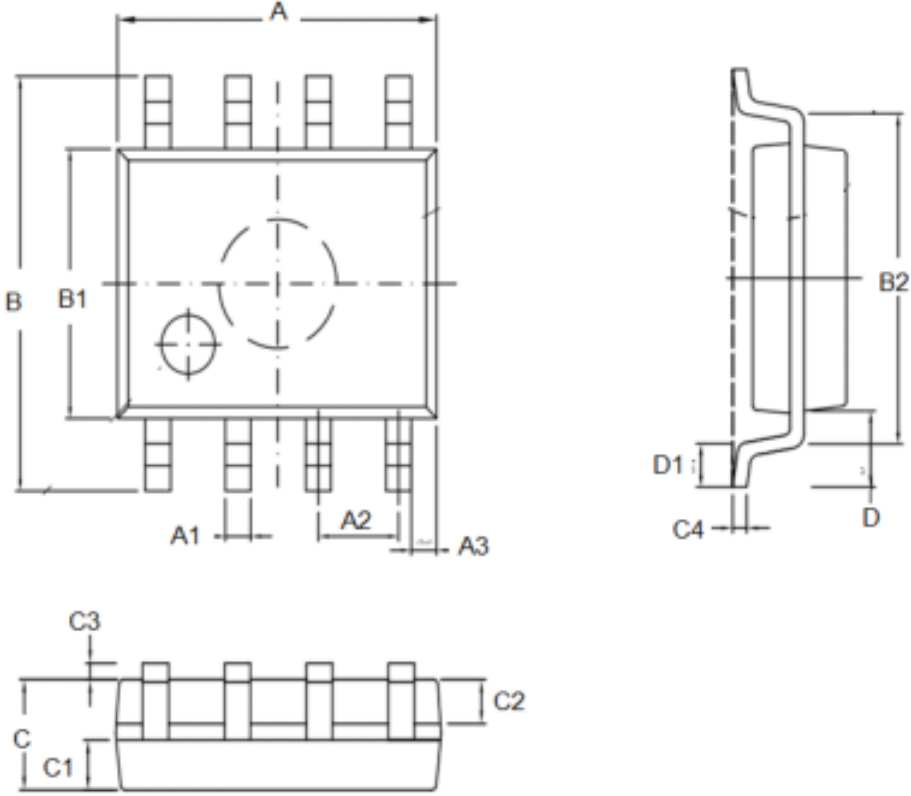**Figure 9 Power De-rating**

Figure 8 Safe Operation Area

Figure 10 Current De-rating

Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8　Package Outline Dimensions

Unit: mm

SYMBOL	min	TYP	max	SYMBOL	min		max
A	4.80		5.25	C	1.30		1.75
A1	0.37		0.49	C1	0.55		0.75
A2		1.27		C2	0.55		0.65
A3		0.41		C3	0.05		0.20
B	5.80		6.20	C4	0.10	0.20	0.23
B1	3.80		4.10	D		1.05	
B2		5.00		D1	0.40		0.62

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