# シングル P チャンネル MOSFET

ELM57433A-S

http://www.elm-tech.com

## ■概要

ELM57433A-S は低入力容量、低電圧駆動、低 ON 抵抗という特性を備えた大電流 MOS FET です。

## ■特長

・Vds=-30V
・Id=-4.2A
・Rds(on) = 60mΩ (Vgs=-10V)
・Rds(on) = 80mΩ (Vgs=-4.5V)

## ■絶対最大定格値

特に指定なき場合、Ta=25℃

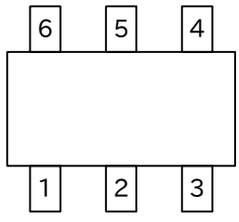
| 項目 | | 記号 | 規格値 | 単位 |
|---|---|---|---|---|
| ドレイン - ソース電圧 | | Vds | -30 | V |
| ゲート - ソース電圧 | | Vgs | ±20 | V |
| 連続ドレイン電流 | Ta=25℃ | Id | -4.2 | A |
| | Ta=70℃ | | -3.2 | |
| パルス・ドレイン電流 | | Idm | -8 | A |
| 最大許容損失 | Tc=25℃ | Pd | 1.5 | W |
| | Tc=70℃ | | 1.0 | |
| 動作接合温度範囲 | | Tj | 150 | ℃ |
| 保存温度範囲 | | Tstg | - 55 ～ 150 | ℃ |

## ■熱特性

| 項目 | 記号 | Typ. | Max. | 単位 |
|---|---|---|---|---|
| 最大接合部 - 周囲温度 | Rθja | | 120 | ℃/W |

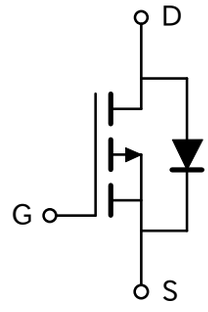
## ■端子配列図

SC-70-6(TOP VIEW)




| 端子番号 | 端子記号 |
|---|---|
| 1 | DRAIN |
| 2 | DRAIN |
| 3 | GATE |
| 4 | SOURCE |
| 5 | DRAIN |
| 6 | DRAIN |

## ■回路

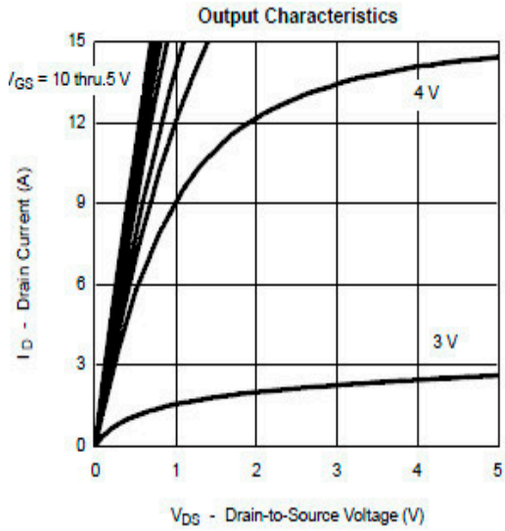


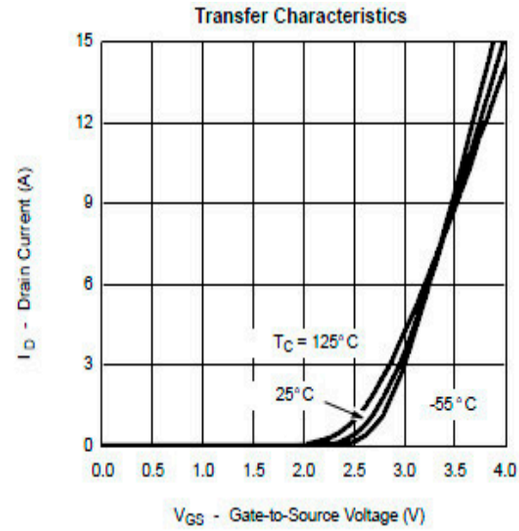
## ■電気的特性

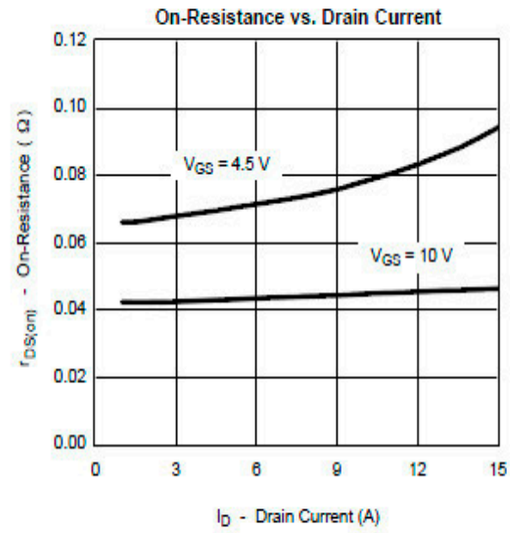
特に指定なき場合、Ta=25℃

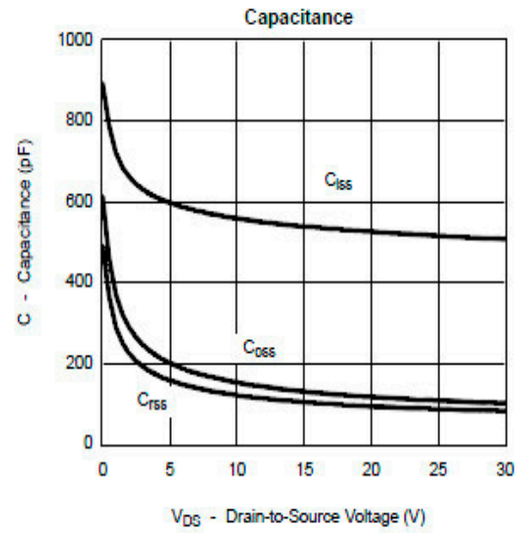
| 項目 | 記号 | 条件 | Min. | Typ. | Max. | 単位 |
|---|---|---|---|---|---|---|
| 静的特性 | | | | | | |
| ドレイン - ソース降伏電圧 | BVdss | Id=-250μA, Vgs=0V | -30 | | | V |
| ゼロ・ゲート電圧ドレイン電流 | Idss | Vds=-24V, Vgs=0V | | | -1 | μA |
| | | Vds=-24V, Vgs=0V, Ta=85℃ | | | -30 | |
| ゲート漏れ電流 | Igss | Vds=0V, Vgs=±12V | | | ±100 | nA |
| ゲート・スレッシュホールド電圧 | Vgs(th) | Vds=Vgs, Id=-250μA | -1.0 | | -2.5 | V |
| オン状態ドレイン電流 | Id(on) | Vgs=-10V, Vds ≧ -5V | -10 | | | A |
| ドレイン - ソースオン状態抵抗 | Rds(on) | Vgs=-10V, Id=-3.6A | | 50 | 60 | mΩ |
| | | Vgs=-4.5V, Id=-3.2A | | 65 | 80 | |
| 順方向相互コンダクタンス | Gfs | Vds=-5V, Id=-4.0A | | 10 | | S |
| ダイオード順方向電圧 | Vsd | Is=-1.7A, Vgs=0V | | -0.7 | -1.3 | V |
| 最大寄生ダイオード連続電流 | Is | | | | -1.4 | A |
| 動的特性 | | | | | | |
| 入力容量 | Ciss | Vgs=0V, Vds=-15V, f=1MHz | | 450 | | pF |
| 出力容量 | Coss | | | 95 | | pF |
| 帰還容量 | Crss | | | 55 | | pF |
| スイッチング特性 | | | | | | |
| 総ゲート電荷 | Qg | Vgs=-10V, Vds=-15V Id≡-3.5A | | 10.0 | 18.0 | nC |
| ゲート - ソース電荷 | Qgs | | | 1.6 | | nC |
| ゲート - ドレイン電荷 | Qgd | | | 3.0 | | nC |
| ターン・オン遅延時間 | td(on) | Vgs=-10V, Vds=-15V RL=15Ω, Id≡-1.0A Rgen=6Ω | | 8 | 18 | ns |
| ターン・オン立ち上がり時間 | tr | | | 8 | 18 | ns |
| ターン・オフ遅延時間 | td(off) | | | 25 | 50 | ns |
| ターン・オフ立ち下がり時間 | tf | | | 25 | 35 | ns |

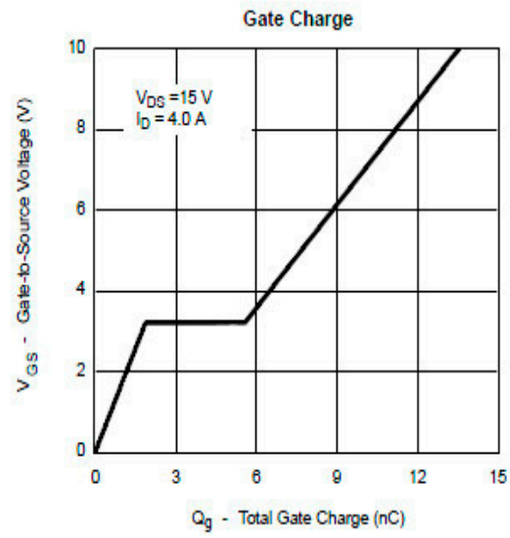
## ■標準特性と熱特性曲線

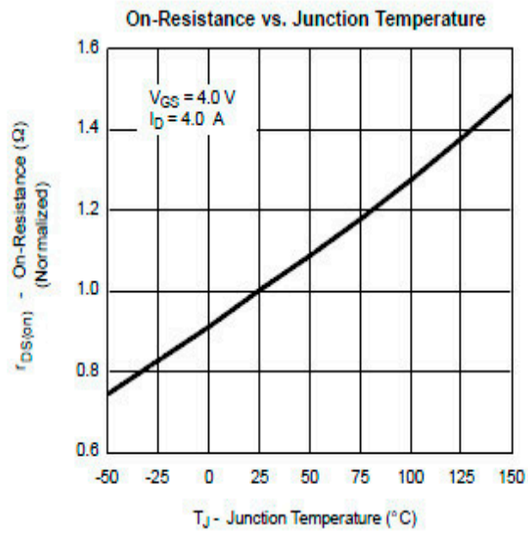

Output Characteristics
VGS = 10 thru.5 V
4 V
3 V
ID - Drain Current (A)
VDS - Drain-to-Source Voltage (V)

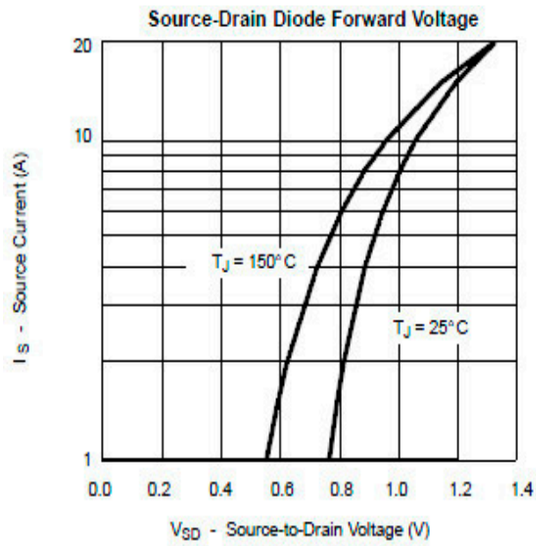

Transfer Characteristics
TC = 125°C
25°C
-55°C
ID - Drain Current (A)
VGS - Gate-to-Source Voltage (V)

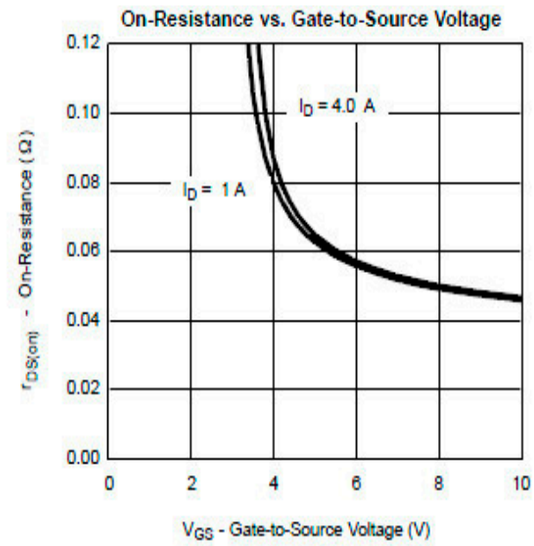

On-Resistance vs. Drain Current
VGS = 4.5 V
VGS = 10 V
rDS(on) - On-Resistance ( Ω )
ID - Drain Current (A)

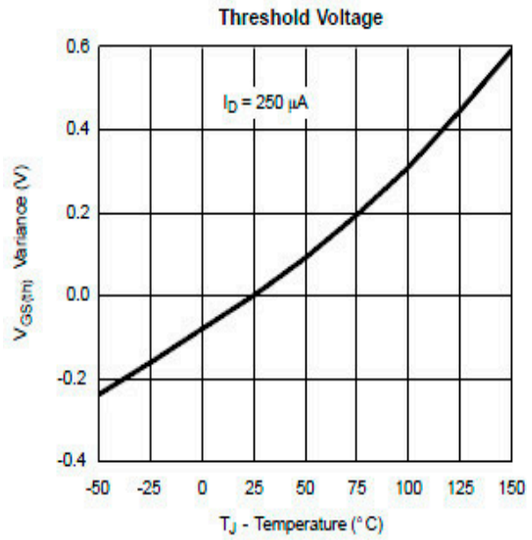

Capacitance
Ciss
Coss
Crss
C - Capacitance (pF)
VDS - Drain-to-Source Voltage (V)

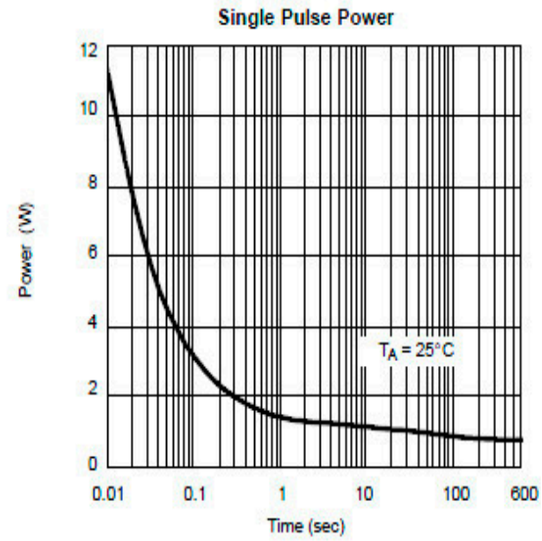

Gate Charge
VDS = 15 V
ID = 4.0 A
VGS - Gate-to-Source Voltage (V)
Qg - Total Gate Charge (nC)

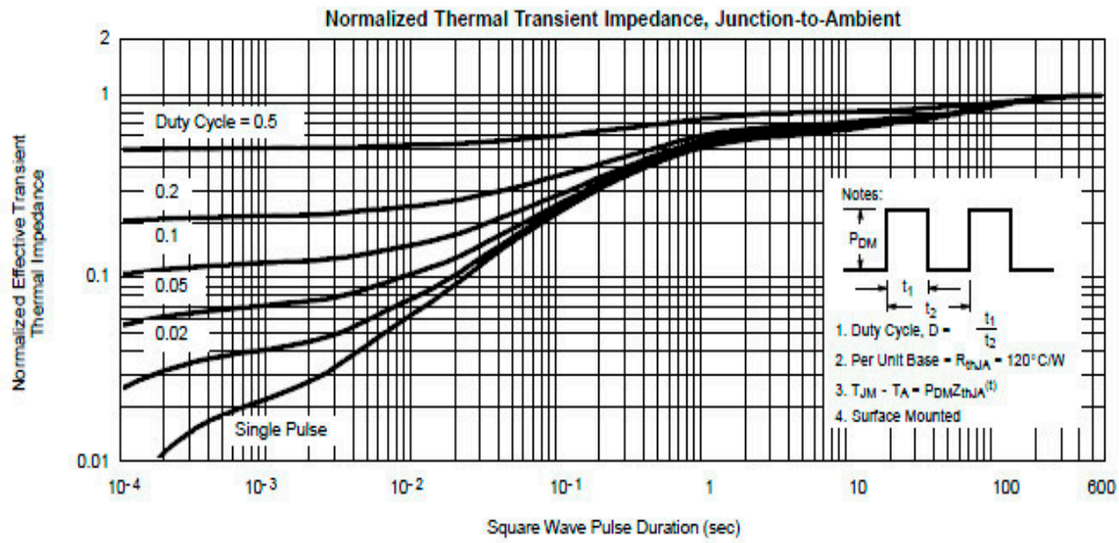

On-Resistance vs. Junction Temperature
VGS = 4.0 V
ID = 4.0 A
rDS(on) - On-Resistance (Ω) (Normalized)
TJ - Junction Temperature (°C)


Source-Drain Diode Forward Voltage
20
10
1
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
$I_S$ - Source Current (A)
$T_J$ = 150°C
$T_J$ = 25°C
$V_{SD}$ - Source-to-Drain Voltage (V)


On-Resistance vs. Gate-to-Source Voltage
0.12
0.10
0.08
0.06
0.04
0.02
0.00
0
2
4
6
8
10
$r_{DS(on)}$ - On-Resistance (Ω)
$I_D$ = 4.0 A
$I_D$ = 1 A
$V_{GS}$ - Gate-to-Source Voltage (V)

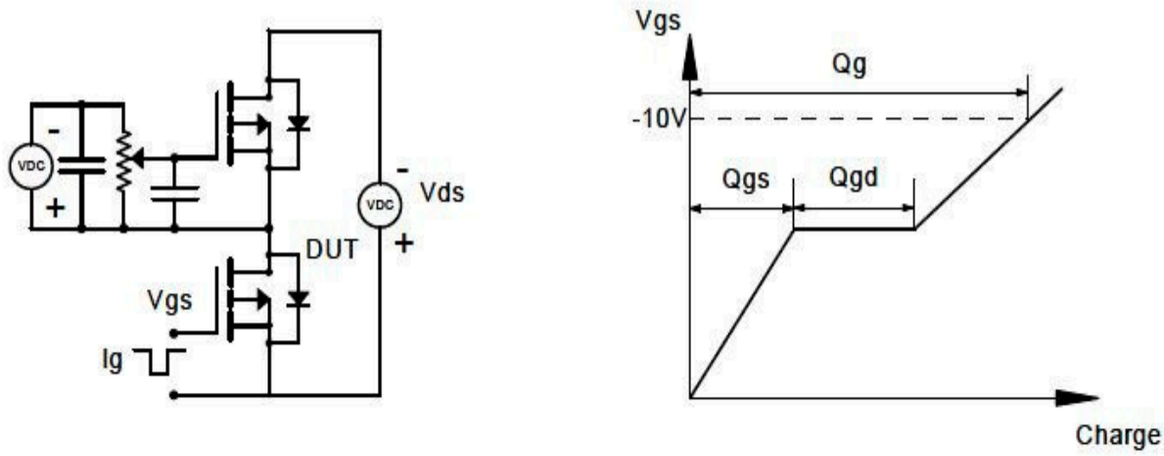

Threshold Voltage
0.6
0.4
0.2
0.0
-0.2
-0.4
-50
-25
0
25
50
75
100
125
150
$V_{GS(th)}$ Variance (V)
$I_D$ = 250 µA
$T_J$ - Temperature (°C)


Single Pulse Power
12
10
8
6
4
2
0
0.01
0.1
1
10
100
600
Power (W)
$T_A$ = 25°C
Time (sec)

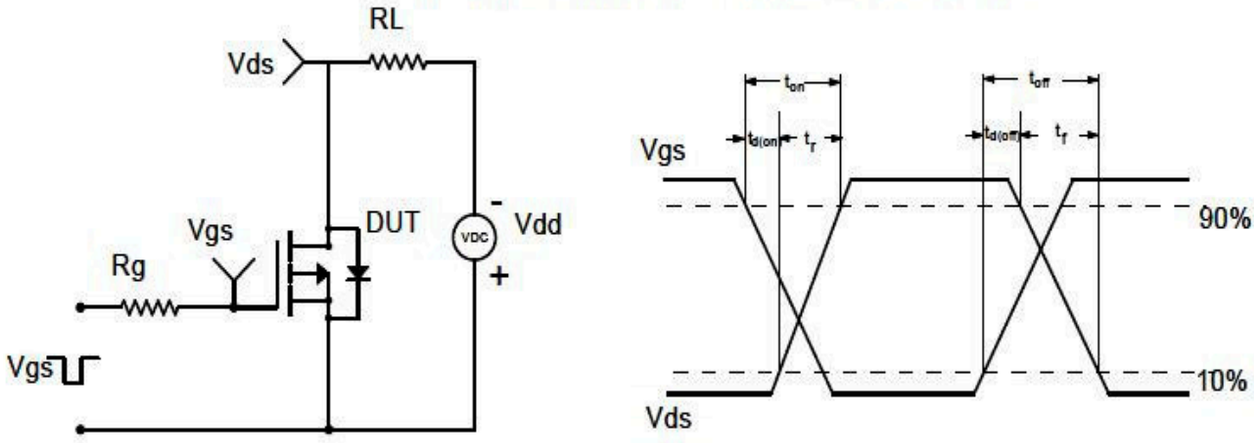

Normalized Thermal Transient Impedance, Junction-to-Ambient
2
1
0.1
0.01
$10^{-4}$
$10^{-3}$
$10^{-2}$
$10^{-1}$
1
10
100
600
Normalized Effective Transient Thermal Impedance
Duty Cycle = 0.5
0.2
0.1
0.05
0.02
Single Pulse
Notes:
$P_{DM}$
$t_1$
$t_2$
1. Duty Cycle, D = $\frac{t_1}{t_2}$
2. Per Unit Base = $R_{\theta JA}$ = 120°C/W
3. $T_{JM}$ - $T_A$ = $P_{DM}Z_{\theta JA}(t)$
4. Surface Mounted
Square Wave Pulse Duration (sec)

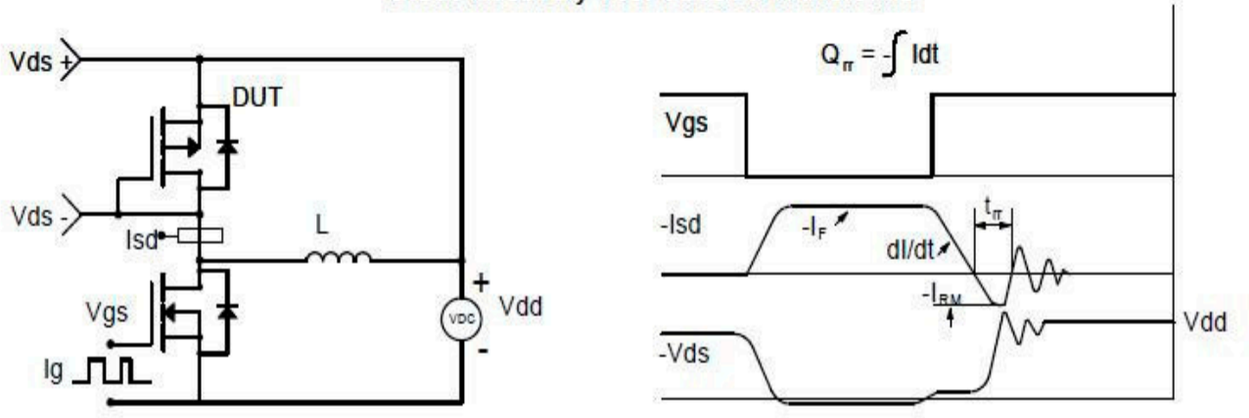
■テスト回路と波形

Gate Charge Test Circuit & Waveform




Resistive Switching Test Circuit & Waveforms




Diode Recovery Test Circuit & Waveforms