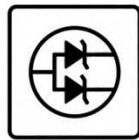# MSKSEMI
SEMICONDUCTOR

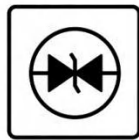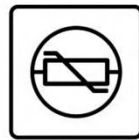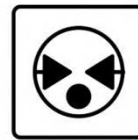| ESD | TVS | TSS | MOV | GDT | PLED |

Product data sheet

Description

The STU417S uses advanced trench technology

to provide excellent $R_{DS(ON)}$, low gate charge and

operation with gate voltages as low as 4.5V. This

device is suitable for use as a

Battery protection or in other Switching application.

TO-252

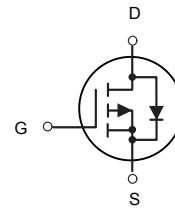## General Features

V_{DS} = -40V I_D =-40A

$R_{DS(ON)}$ < 21 mΩ＠V_{GS}=10V

Application

Battery protection

Load switch

Uninterruptible power supply

P-Channel MOSFET

Absolute Maximum Ratings (T_C=25℃ unless otherwise noted)

Symbol	Parameter	Rating	Units
VDS	Drain-Source Voltage	-40	V
VGS	Gate-Source Voltage	±20	V
I_D@T_C=25℃	Continuous Drain Current, V_{GS} @ 10V[1]	-40	A
I_D@T_C=100℃	Continuous Drain Current, V_{GS} @ 10V[1]	-25	A
IDM	Pulsed Drain Current[2]	-144	A
P_D@T_C=25℃	Total Power Dissipation[4]	30	W
TSTG	Storage Temperature Range	-55 to 150	℃
T_J	Operating Junction Temperature Range	-55 to 150	℃
$R_{\theta}JA$	Thermal Resistance Junction-ambient [1]	62	℃/W
$R_{\theta}JC$	Thermal Resistance Junction-Case[1]	2.5	℃/W

Electrical Characteristics (T$_J$=25 ℃, unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV$_{DSS}$	Drain-Sourtce Breakdown Voltage	V$_{GS}$=0V,I$_D$=-250μA	-40	---	---	V
I$_{DSS}$	Zero Gate Voltage Drain Current	V$_{GS}$=0V, V$_{DS}$=-40V	---	---	-1	μA
I$_{GSS}$	Gate-Source Leakage Current	V$_{GS}$=±20V, V$_{DS}$=0A	---	---	±100	nA
On Characteristics						
V$_{GS(th)}$	GATE-Source Threshold Voltage	V$_{GS}$=V$_{DS}$, I$_D$=-250μA	-1.1	-1.7	-2.5	V
R$_{DS(ON)}$	Drain-Source On Resistance	V$_{GS}$=-10V,I$_D$=-20A	---	15	21	mΩ
		V$_{GS}$=-4.5V,I$_D$=-15A	---	21	32	
G$_{FS}$	Forward Transconductance	V$_{DS}$=-5V, I$_D$=-5A	15	---	---	S
Dynamic Characteristics						
C$_{iss}$	Input Capacitance	V$_{DS}$=-20V, V$_{GS}$=0V, f=1MHz	---	2050	---	pF
C$_{oss}$	Output Capacitance		---	260	---	
C$_{rss}$	Reverse Transfer Capacitance		---	150	---	
Switching Characteristics						
t$_{d(on)}$	Turn-On Delay Time	V$_{DS}$=-20V, R$_L$=1.6Ω R$_{GEN}$=3Ω , V$_{GS}$=-10V	---	10	---	ns
t$_r$	Rise Time		---	24	---	ns
t$_{d(off)}$	Turn-Off Delay Time		---	40	---	ns
t$_f$	Fall Time		---	9	---	ns
Q$_g$	Total Gate Charge	V$_{GS}$=-10V, V$_{DS}$=-20V, I$_D$=-8A	---	45	---	nC
Q$_{gs}$	Gate-Source Charge		---	6	---	nC
Q$_{gd}$	Gate-Drain "Miller" Charge		---	11	---	nC
Drain-Source Diode Characteristics						
V$_{SD}$	Source-Drain Diode Forward Voltage	V$_{GS}$=0V,I$_S$=-10A,	---	---	-1.2	V
I$_{SD}$	Source-Drain Current(Body Diode)		---	---	-36	A

Notes:

1.Repetitive Rating: Pulse width limited by maximum junction temperature
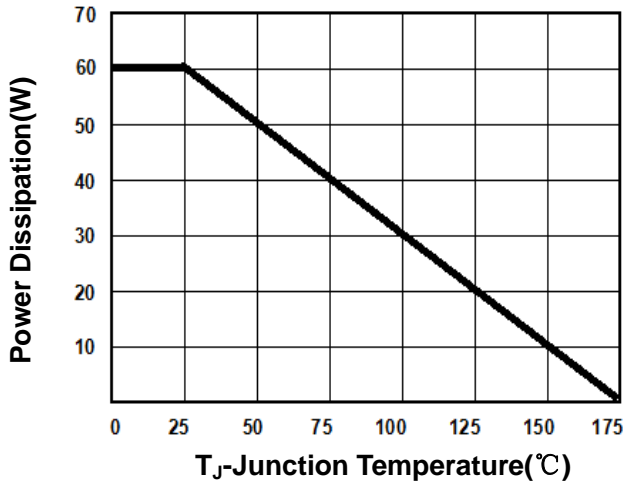
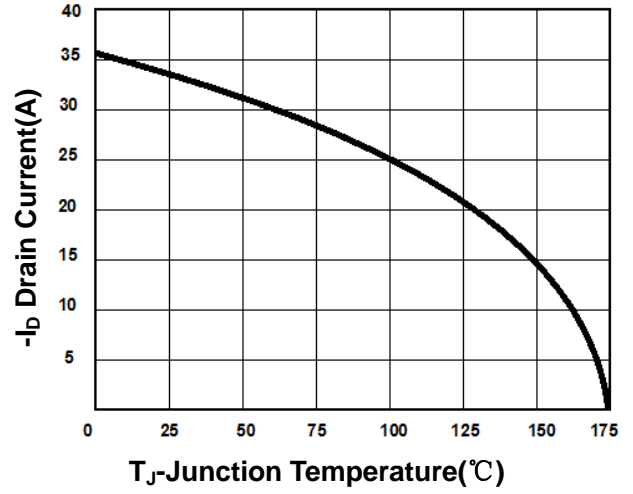## Typical Characteristics

Figure1. Power Dissipation

Power Dissipation(W) vs T_J-Junction Temperature(℃)

Figure2. Drain Current

$-I_D$ Drain Current(A) vs T_J-Junction Temperature(℃)

Figure3. Output Characteristics

$-I_D$ (A) vs $-V_{DS}$ (Volts)

-6V
-5V
-10V
-4.5V
V_{GS}=-4V
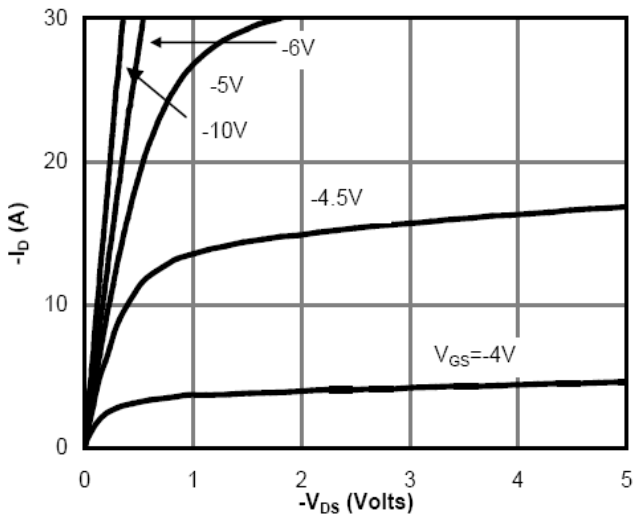
Figure4. Transfer Characteristics

$-I_D$- Drain Current (A) vs -Vgs Gate-Source Voltage (V)

V_{DS}=-5V

Figure5. Capacitance

C Capacitance(pF) vs -VDS Drain-to-Source Voltage(V)

Ciss
Coss
Crss
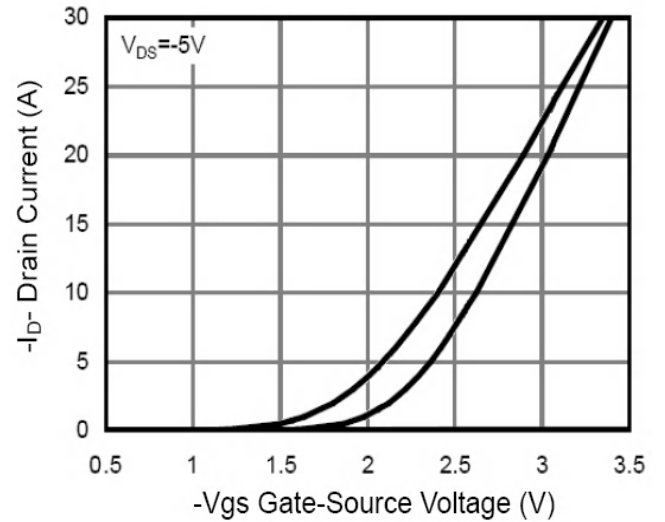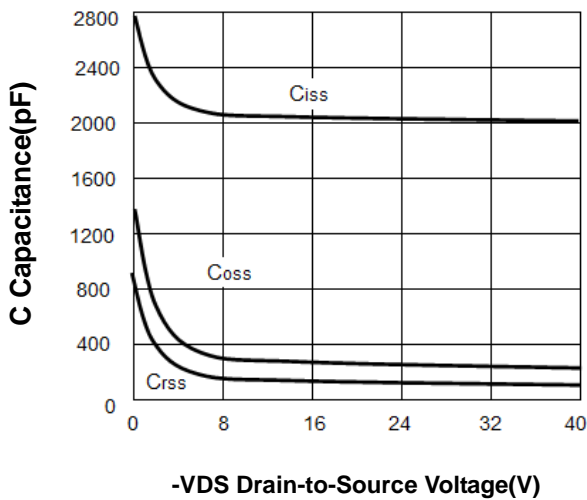
Figure6. $R_{DS(ON)}$ vs Junction Temperature

Normalized On-Resistance vs Temperature (°C)

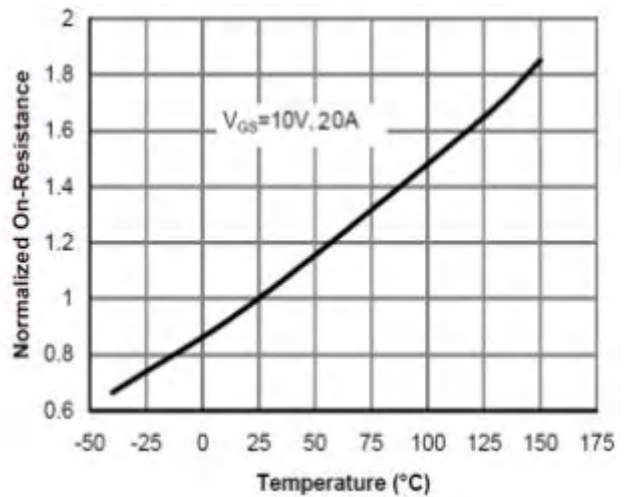V_{GS}=10V, 20A
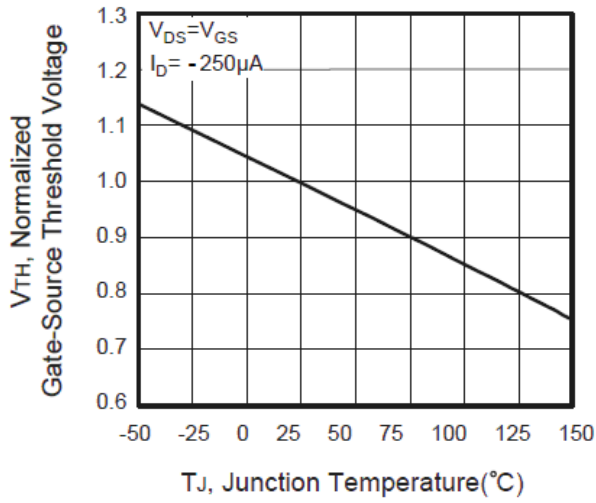
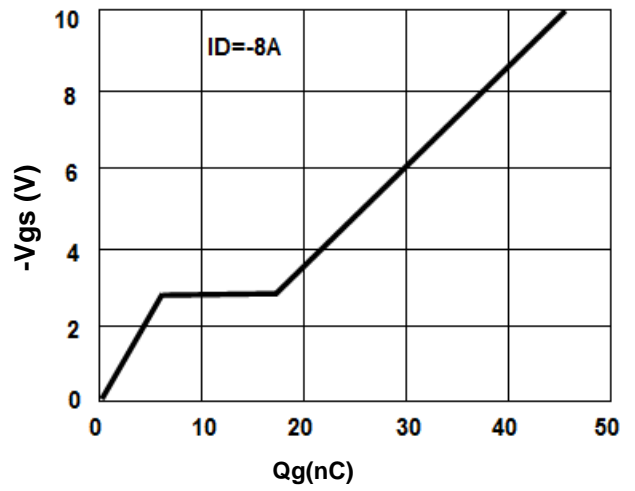**Figure7. $V_{GS(th)}$ vs Junction Temperature**
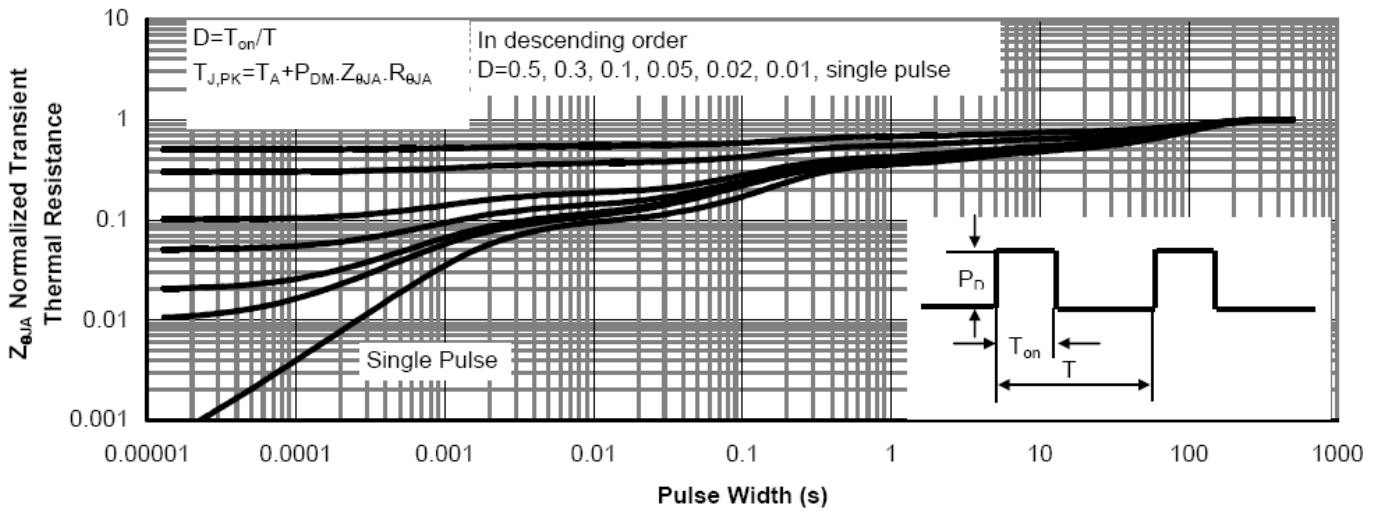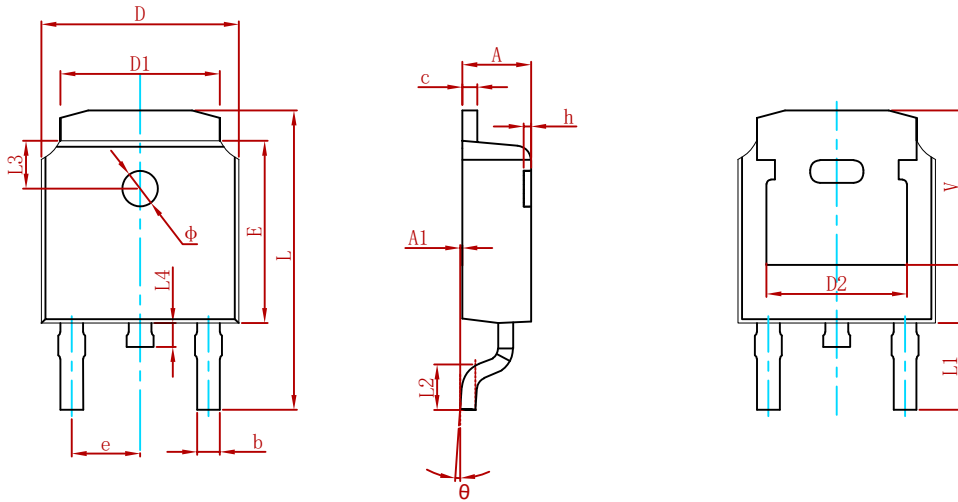

Figure8. Gate Charge Waveforms


Figure9. Normalized Maximum Transient Thermal Impedance

PACKAGE MECHANICAL DATA

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.635	0.770	0.025	0.030
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 REF.		0.190 REF.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.712	10.312	0.382	0.406
L1	2.900 REF.		0.114 REF.	
L2	1.400	1.700	0.055	0.067
L3	1.600 REF.		0.063 REF.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.250 REF.		0.207 REF.	

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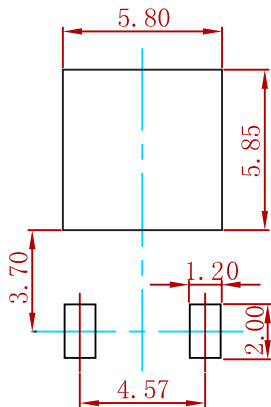
Note:
1.Controlling dimension:in millimeters.
2.General tolerance:± 0.05mm.
3.The pad layout is for reference purposes only.

REEL SPECIFICATION

P/N	PKG	QTY
STU417S	TO-252	2500

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