

MOSFET Metal-Oxide-Semiconductor Field-Effect Transistor

100V P-Channel MOSFET

General Description

The SK35P10P uses advanced Trench technology and designs to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

BV_{DSS}	$R_{DS(ON)}$	I_D
-100V	44mΩ	-35A

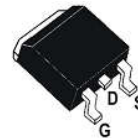
Features

- Improved dv/dt capability
- Low Input Capacitance
- 100% EAS Guaranteed
- Green Device Available

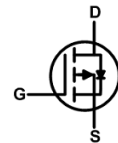
Applications

- Net Working
- Load Switch
- LED Application
- Quick Charger

TO-252



Graphic Symbol



Maximum Ratings ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V _{DSS}	-100	V
Gate-Source Voltage		V _{GSS}	±20V	V
Drain Current-Continuous	T _C =25°C NOTE 1	I _D	-35	A
	T _C =100°C NOTE 1		-23	
Drain Current-Pulsed NOTE 2		I _{DM}	-100	A
Single Pulse Avalanche Current		I _{AS}	28	A
Single Pulse Avalanche Energy NOTE 3		E _{AS}	392	mJ
Maximum Power Dissipation @ T _C =25°C NOTE 4		P _D	104	W
Storage Temperature Range		T _{STG}	-50 to 150°C	°C
Operating Junction Temperature Range		T _J	-50 to 150°C	°C

Parameter	Symbol	Conditions	Min.	Typ	Max	Unit
Maximum Junction-to-Ambient NOTE 1	$R_{\theta JA}$	Steady State	-	-	62	$^{\circ}\text{C/W}$
Maximum Junction-to-Case NOTE 1	$R_{\theta JC}$	Steady State	-	-	1.2	$^{\circ}\text{C/W}$

Electrical Characteristics (T_A=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V , I _{DS} =-250uA	-100	-	-	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-100V, V _{GS} =0V, T _J =25°C	-	-	-1	uA
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±20V , V _{DS} =0V	-	-	±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _{DS} =-250uA	-1.2	-1.8	-2.5	V
Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =-10V , I _{DS} =-10A	-	44	50	mΩ
		V _{GS} =-4.5V , I _{DS} =-8A	-	48	55	
Forward Transconductance	g _{fs}	V _{DS} =-10V , I _D =-10A	-	32	-	S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iss}	V _{DS} =-20V, V _{GS} =0V, f=1MHz	-	6500	-	pF
Output Capacitance	C _{oss}		-	225	-	
Reverse Transfer Capacitance	C _{rss}		-	130	-	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	T _{d(on)}	V _{DS} =-50V, I _D =-14A, R _{GEM} =3.3 Ω , V _{GS} =-10V	-	21	-	ns
Rise Time	t _r		-	32	-	
Turn-Off Delay Time	T _{d(off)}		-	125	-	
Fall Time	t _f		-	64.2	-	
Total Gate Charge	Q _g	V _{DS} =-80V, I _{DS} =-14A, V _{GS} =-10V	-	90	-	nC
Gate to Source Gate Charge	Q _{gs}		-	18.2	-	
Gate to Drain "Miller" Charge	Q _{gd}		-	14.5	-	
SWITCHING CHARACTERISTICS						
Drain-Source Diode Forward Voltage ²	V _{SD}	V _{GS} =0V, I _S =-1A, T _J =25°C	-	-	-1.2	V
Continuous Source Current ^{NOTE1, 5}	I _S	V _G =V _D =0V , Force Current	-	-	-35	A
Pulsed Source Current ^{NOTE1, 5}	I _{SM}		-	-	-90	A

Notes:

1. The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper.
2. The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%
3. The EAS data shows Max. rating. The test condition is V_{DD}=-25V, V_{GS}=-10V, L=1mH, I_{AS}=-28A
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation

Typical Operating Characteristics

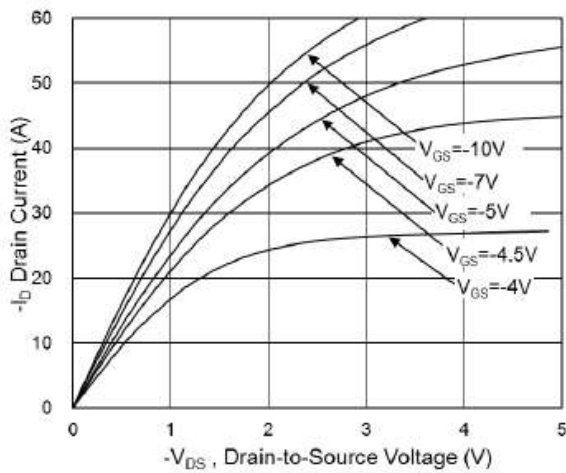


Fig.1 Typical Output Characteristics

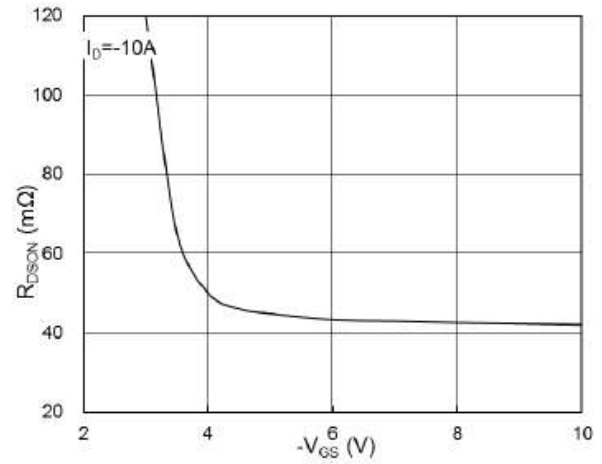


Fig.2 On-Resistance vs. G-S Voltage

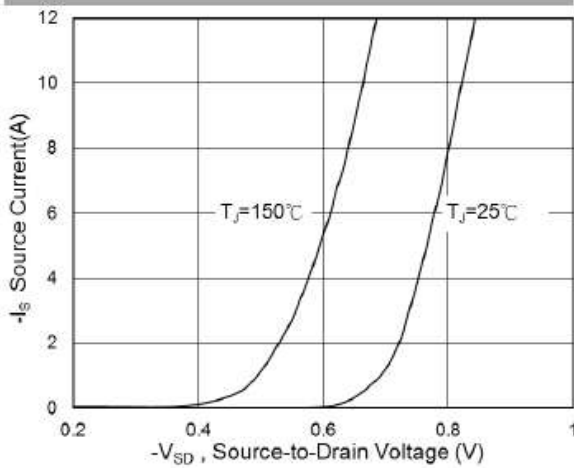


Fig.3 Typical S-D Diode Forward Voltage

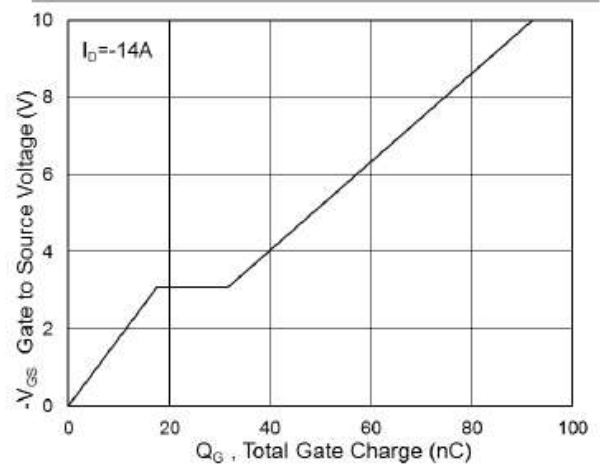


Fig.4 Gate-Charge Characteristics

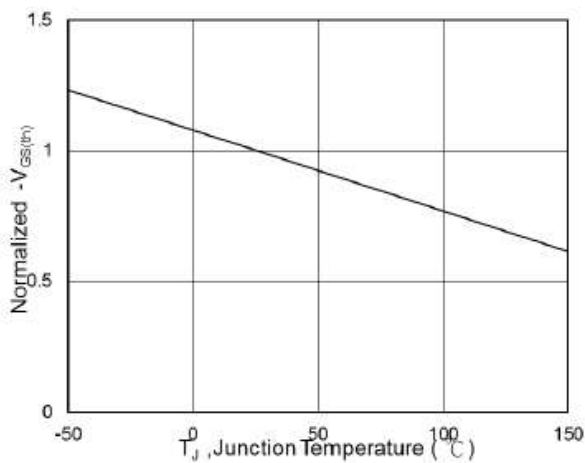


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

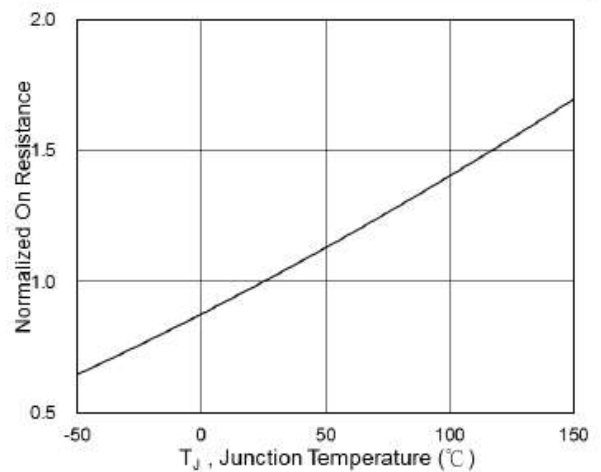


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

Typical Operating Characteristics (Cont.)

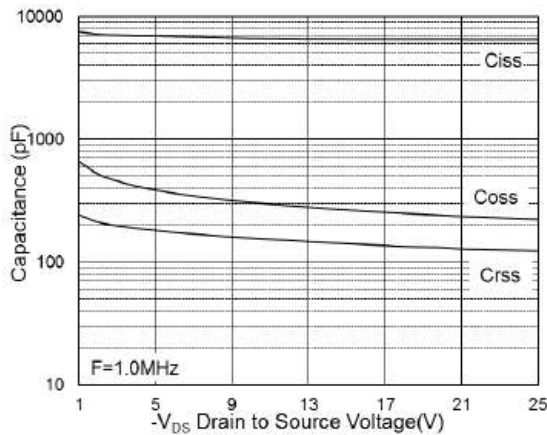


Fig.7 Capacitance

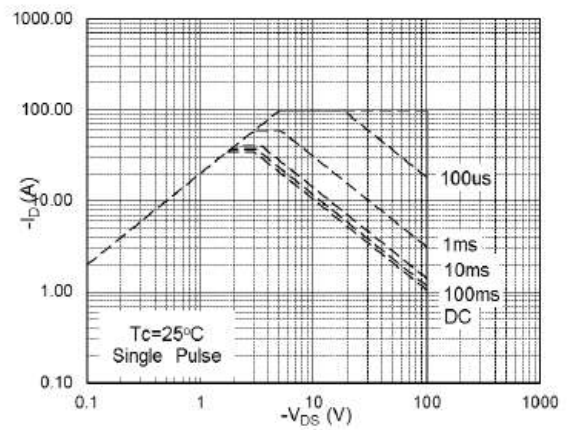


Fig.8 Safe Operating Area

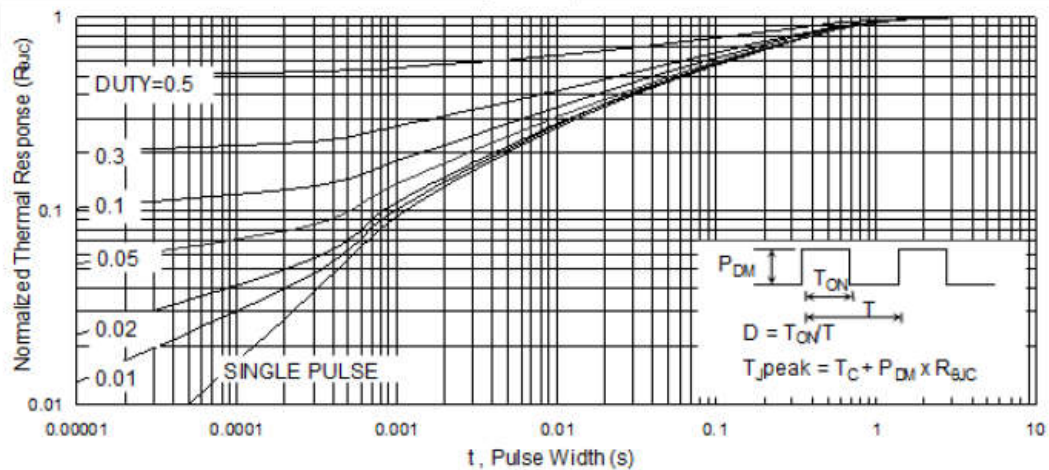


Fig.9 Normalized Maximum Transient Thermal Impedance

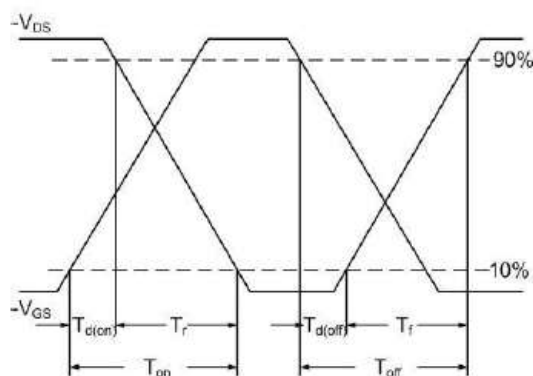


Fig.10 Switching Time Waveform

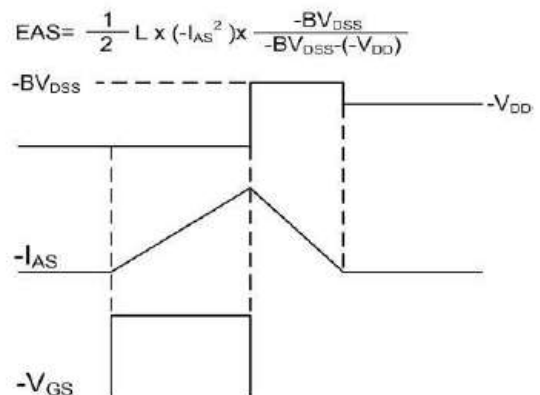
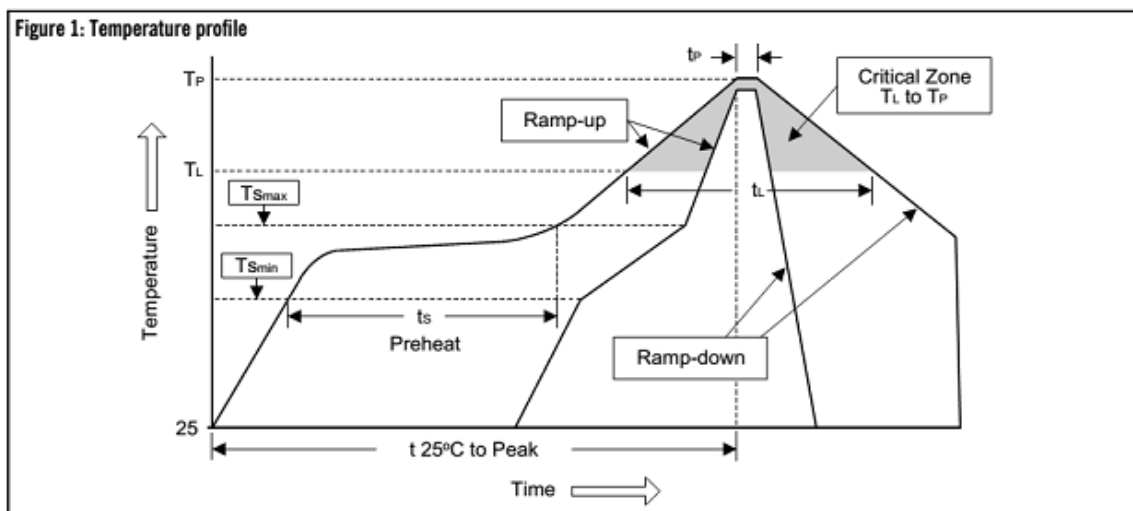


Fig.11 Unclamped Inductive Waveform

Soldering Methods for SK Product

1. Storage environment: Temperature=10°C to 35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

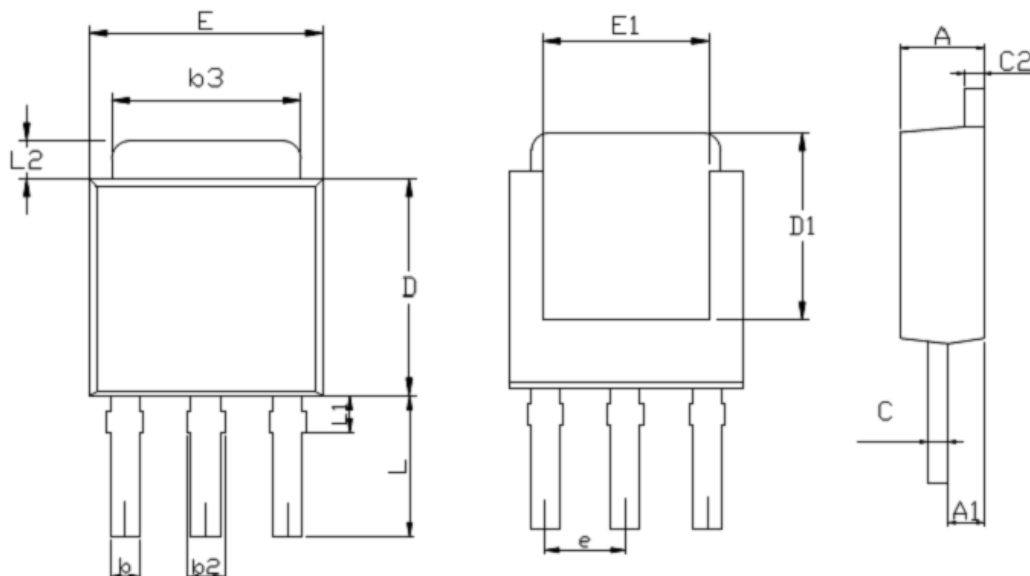


Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T_{smin})	100°C	150°C
- Temperature Max (T_{smax})	150°C	200°C
- Time (min to max) (t_s)	60 to 120 sec	60 to 180 sec
T_{smax} to T_L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T_L)	183°C	217°C
- Time (t_L)	60 to 150 sec	60 to 150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_p)	10 to 30 sec	20 to 40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak Temperature	Dipping Time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec

PACKAGE DIMENSION



Symbol	TO-252-2			
	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	2.184	2.338	0.086	0.094
A1	0.890	1.143	0.035	0.045
b	0.635	0.890	0.025	0.035
b2	0.910	1.143	0.035	0.045
b3	4.953	5.460	0.195	0.215
c	0.457	0.610	0.018	0.024
c1	0.457	0.890	0.018	0.035
D	5.334	6.223	0.210	0.245
D1	5.207		0.205	
E	6.350	6.730	0.250	0.265
E1	4.320		0.170	
e	2.29 BSC		0.090 BSC	
L	3.700	4.400	0.146	0.173
L1	0.850	1.250	0.033	0.049
L2	0.890	1.270	0.035	0.050