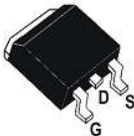
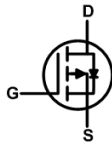


# MOSFET Metal-Oxide-Semiconductor Field-Effect Transistor

## 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.				
Product Summary			TO-252	
$BV_{DSS}$	-100	V		
$R_{DS(ON)} @ V_{GS}=-10V$	50(Max.)	m $\Omega$		
$R_{DS(ON)} @ V_{GS}=-4.5V$	55(Max.)	m $\Omega$		
$I_D$	-35	A		
Features		Applications		Graphic Symbol
<ul style="list-style-type: none"> <li>Improved dv/dt capability</li> <li>Low Input Capacitance</li> <li>100% EAS Guaranteed</li> <li>Green Device Available</li> </ul>		<ul style="list-style-type: none"> <li>Net Working</li> <li>Load Switch</li> <li>LED Application</li> <li>Quick Charger</li> </ul>		

### 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	$V_{GSS}$	$\pm 20V$	V
Drain Current-Continuous	$I_D$	$T_C=25^\circ\text{C}$ NOTE 1	-35
		$T_C=100^\circ\text{C}$ 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 @ $T_C=25^\circ\text{C}$ NOTE 4	$P_D$	104	W
Storage Temperature Range	$T_{STG}$	-50 to 150 $^\circ\text{C}$	$^\circ\text{C}$
Operating Junction Temperature Range	$T_J$	-50 to 150 $^\circ\text{C}$	$^\circ\text{C}$

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	$^\circ\text{C/W}$

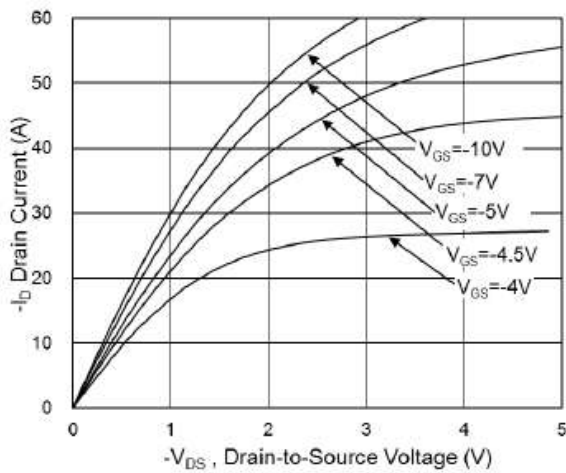
## Electrical Characteristics (T<sub>A</sub>=25°C unless otherwise noted)

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

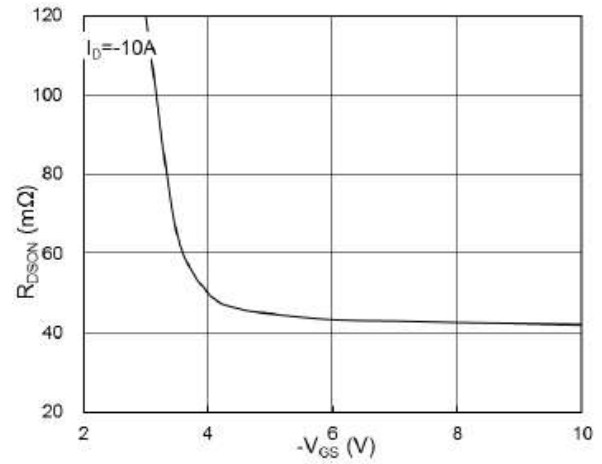
**Notes:**

1. The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ 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<sub>DD</sub>=-25V, V<sub>GS</sub>=-10V, L=1mH, I<sub>AS</sub>=-28A
4. The power dissipation is limited by 150°C junction temperature
5. The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub>, in real applications, should be limited by total power dissipation

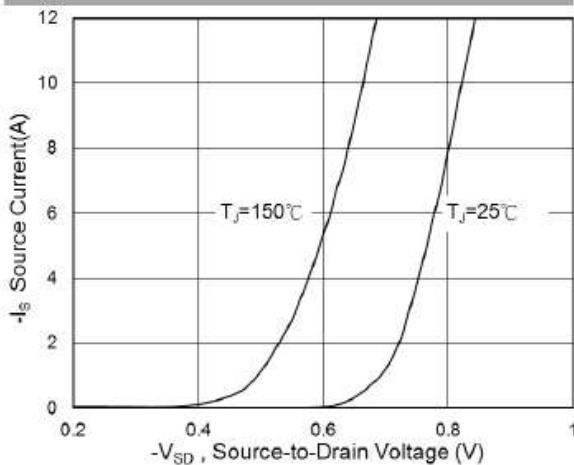
## Typical Operating Characteristics



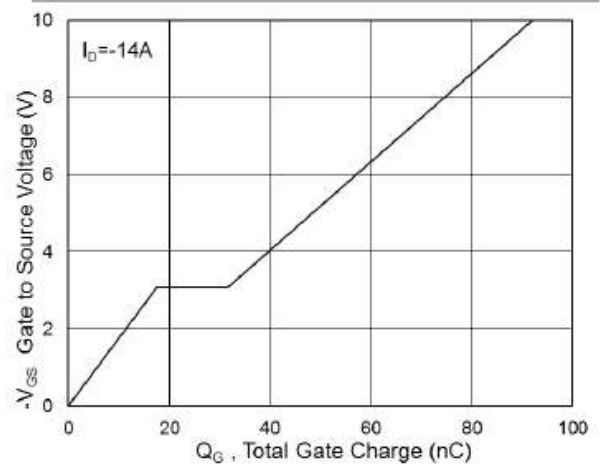
**Fig.1 Typical Output Characteristics**



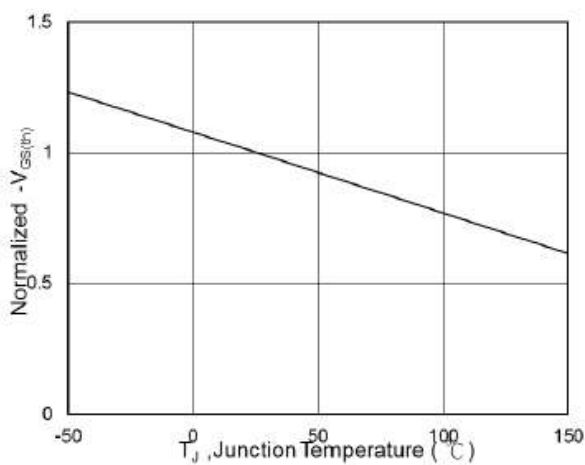
**Fig.2 On-Resistance vs. G-S Voltage**



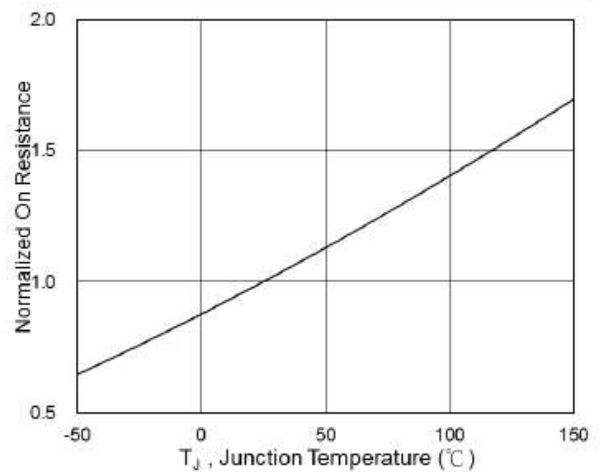
**Fig.3 Typical S-D Diode Forward Voltage**



**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.)

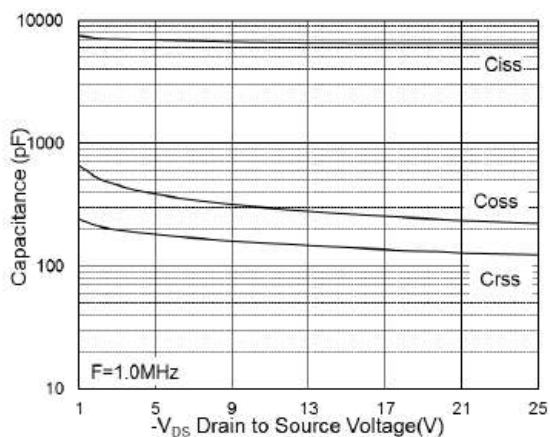


Fig.7 Capacitance

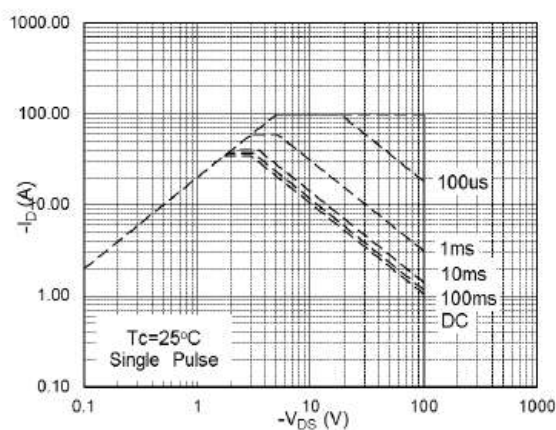


Fig.8 Safe Operating Area

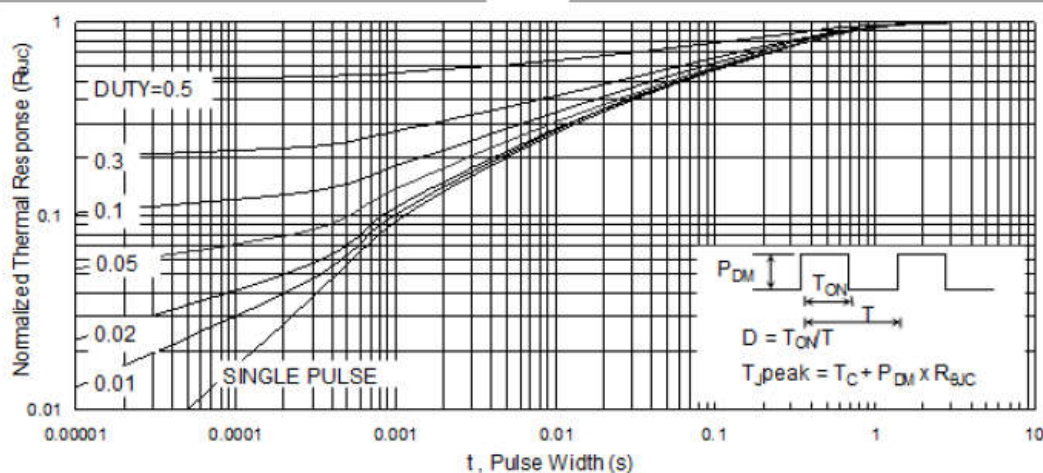


Fig.9 Normalized Maximum Transient Thermal Impedance

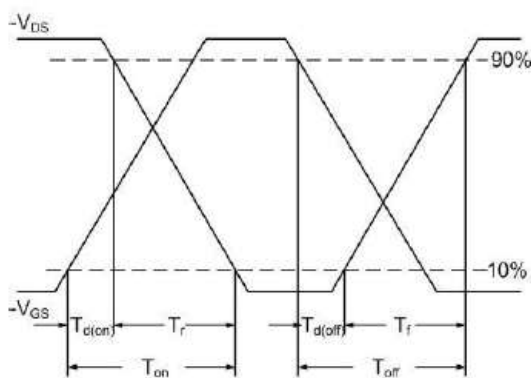


Fig.10 Switching Time Waveform

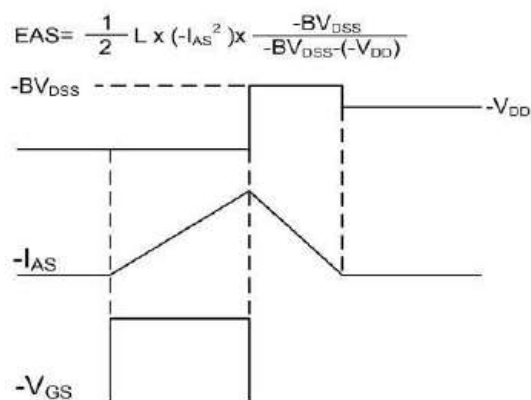
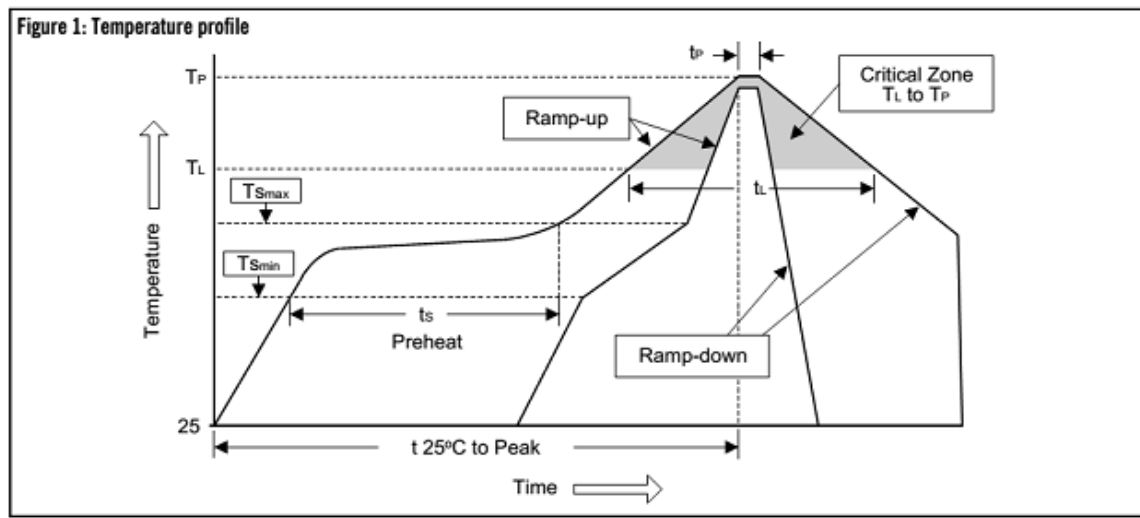


Fig.11 Unclamped Inductive Waveform

## Soldering Methods for SK Product

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

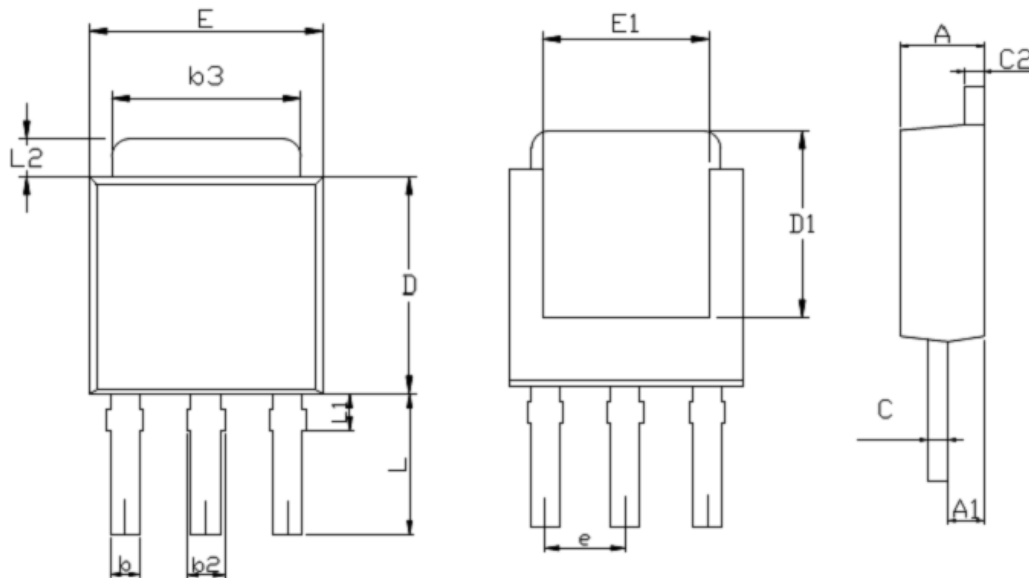


Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate ( $T_l$ to $T_p$ )	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min ( $T_{Smin}$ )	100°C	150°C
- Temperature Max ( $T_{Smax}$ )	150°C	200°C
- Time (min to max) ( $t_s$ )	60 to 120 sec	60 to 180 sec
$T_{Smax}$ to $T_l$		
- Ramp-up 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

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