

60V P-Channel MOSFET

BV_{DSS} -60V

$R_{DS(ON)}$ 48mΩ(max.)@ $V_{GS}=10V$

$R_{DS(ON)}$ 65mΩ(max.)@ $V_{GS}=4.5V$

I_D -16A

BV_{DSS}	$R_{DS(ON)}$	I_D
-60V	40mΩ	-16A

Description

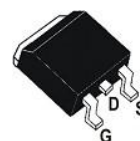
The SK15P06 uses advanced Trench technology and designs to provide excellent $R_{DS(ON)}$ with low gate charge. This device is suitable for use in PWM, load switching and general purpose applications.

Features

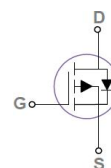
- Low On-Resistance
- Low Input Capacitance
- Fast Switching

Applications

- Motor Drive
- Power Tool
- LED Application



TO-252



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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DSS}	-60V	V
Gate-Source Voltage	V_{GSS}	±20V	V
Drain Current-Continuous @ $T_C=25^{\circ}C$	I_D	-16	A
Drain Current-Continuous @ $T_C=100^{\circ}C$		-10	A
Drain Current-Pulsed ^{NOTE 1}	I_{DM}	-64	A
Single Pulse Avalanche Energy ^{NOTE 2}	EAS	51	mJ
Single Pulse Avalanche Current ^{NOTE 2}	IAS	-32	A
Maximum Power Dissipation @ $T_C=25^{\circ}C$	P_D	25	W
Maximum Power Dissipation – Derate above 25°C		0.2	W / °C
Storage Temperature Range	T_{STG}	-55 to 150°C	°C
Operating Junction Temperature Range	T_J	-55 to 150°C	°C

Thermal Resistance Ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Maximum Junction-to-Ambient	$R_{\theta JA}$	Steady State	-	-	62	°C/W
Maximum Junction-to-Case	$R_{\theta JC}$	Steady State	-	-	5	°C/W

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Electrical Characteristics(T _J =25°C unless otherwise noted)						
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-Source Breakdown Voltage	B _V DSS	V _{GS} =0V , I _{DS} =-250uA	-60	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-48V, V _{GS} =0V	-	-	-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	-1.0	-1.6	-2.5	V
Drain-Source On-Resistance	R _{DS(ON)}	V _{GS} =-10V , I _{DS} =-8A	-	40	48	mΩ
		V _{GS} =-4.5V , I _{DS} =-4A	-	53	65	mΩ
Forward Transconductance	g _{fs}	V _{DS} =-10V , I _D =-8A	-	10	-	S
DYNAMIC CHARACTERISTICS						
Input Capacitance	C _{iss}	V _{DS} =-30V, V _{GS} =0V, f=1MHz	-	1250	-	pF
Output Capacitance	C _{oss}		-	90	-	
Reverse Transfer Capacitance	C _{rss}		-	58	-	
SWITCHING CHARACTERISTICS						
Turn-On Delay Time ^{NOTE 3, 4}	T _{d(on)}	V _{DS} =-30V, V _{GS} =-10V, I _D =-1A , R _{GEM} =6Ω	-	13.5	-	ns
Rise Time ^{NOTE 3, 4}	t _r		-	42	-	
Turn-Off Delay Time ^{NOTE 3, 4}	T _{d(off)}		-	66	-	
Fall Time ^{NOTE 3, 4}	t _f		-	15.8	-	
Total Gate Charge at 4.5V ^{NOTE 3, 4}	Q _g	V _{DS} =-30V, I _{DS} =-8A, V _{GS} =-10V	-	23	-	nC
Gate to Source Gate Charge ^{NOTE 3, 4}	Q _{gs}		-	4	-	
Gate to Drain "Miller" Charge ^{NOTE 3, 4}	Q _{gd}		-	5.1	-	
Drain-Source Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =1A, T _J =25°C	-	-	-1.0	V
Continuous Source Current	I _S	V _G =V _D =0V , Force Current	-	-	-16	A
Pulsed Source Current	I _{SM}		-	-	-64	A

Notes:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
3. Essentially independent of operating temperature

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Typical Operating Characteristics

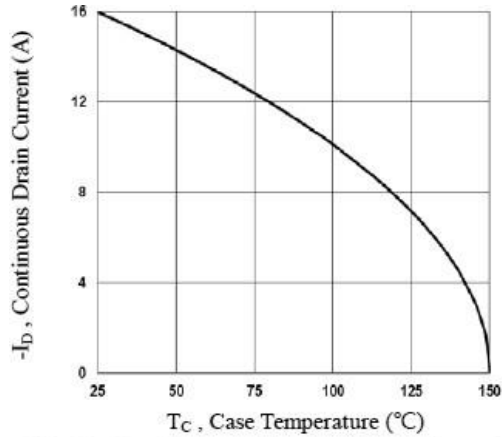


Fig.1 Continuous Drain Current vs. T_c

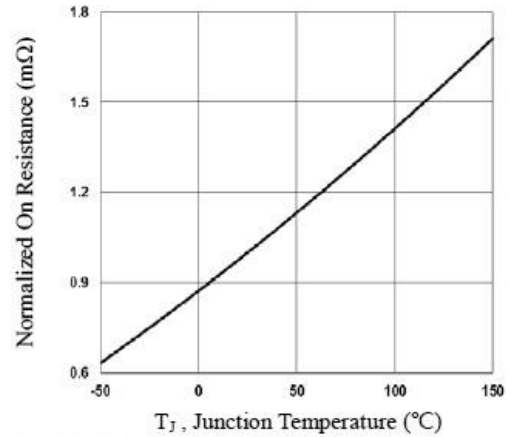


Fig.2 Normalized $R_{DS(on)}$ vs. T_j

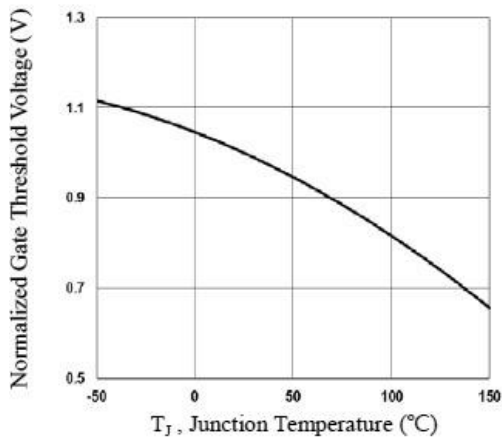


Fig.3 Normalized V_{th} vs. T_j

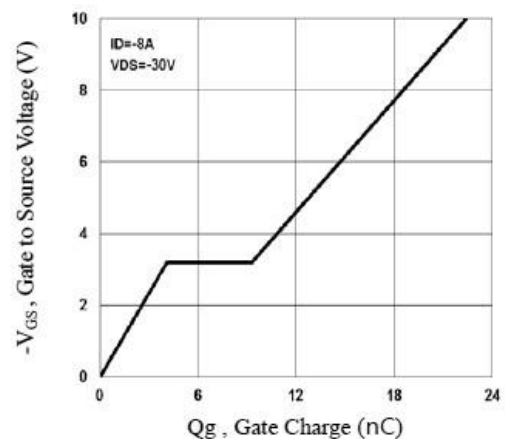


Fig.4 Gate Charge Waveform

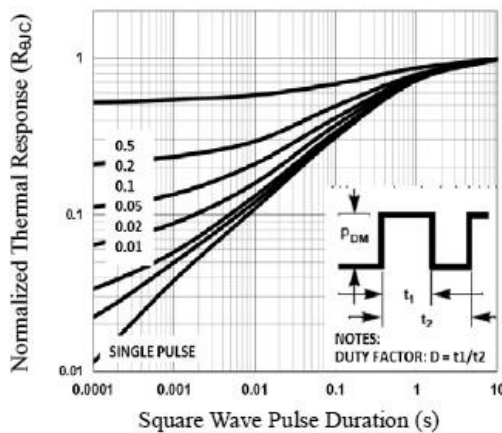


Fig.5 Normalized Transient Impedance

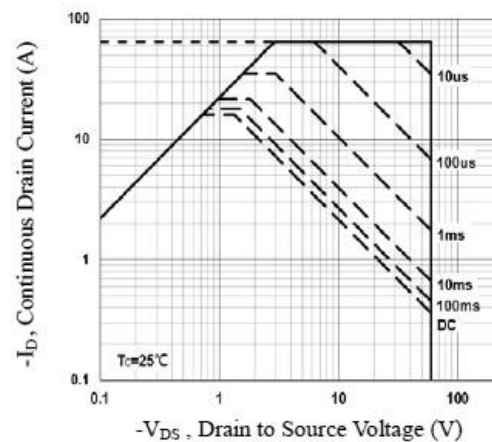


Fig.6 Maximum Safe Operation Area

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Typical Operating Characteristics (Cont.)

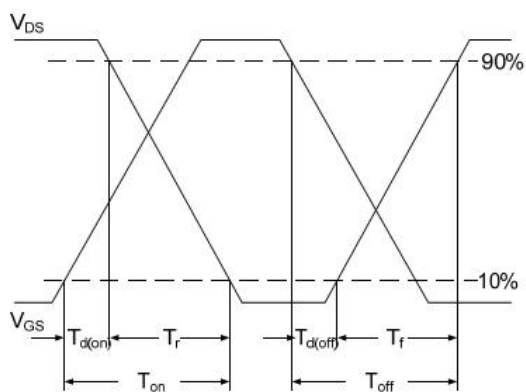


Fig.7 Switching Time Waveform

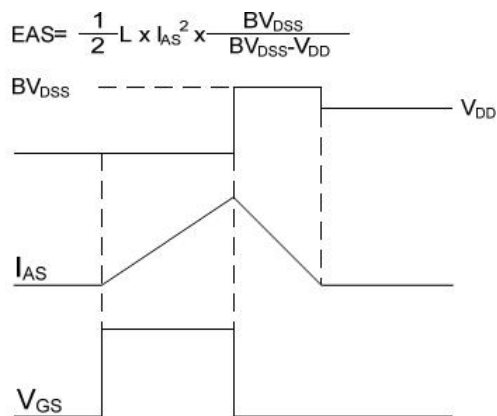
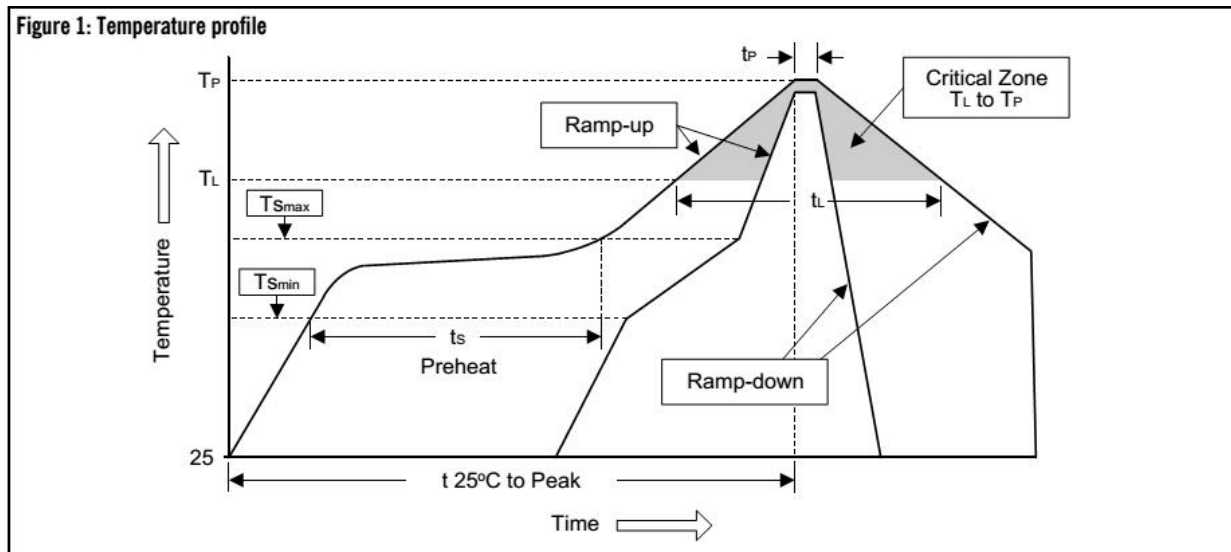


Fig.8 EAS Waveform

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Soldering Methods for RA Product

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



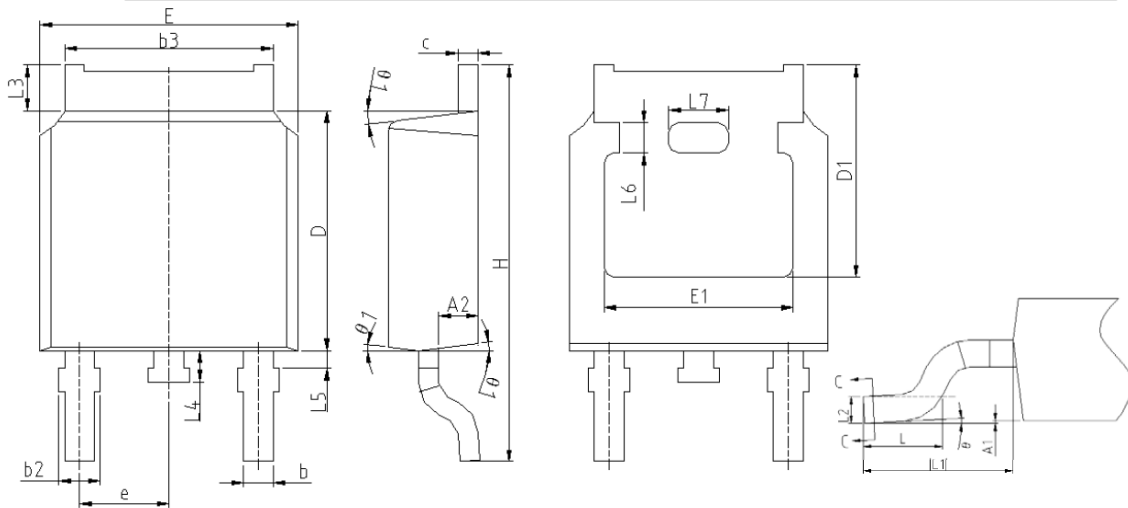
Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat		
- Temperature Min (T_{smin})	100°C	150°C
- Temperature Max (T_{smax})	150°C	200°C
- Time (min to max) (t_s)	60 to 120 sec	60 to 180 sec
T_{smax} to T_L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
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

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PACKAGE DIMENSION



Symbol	TO-252			
	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