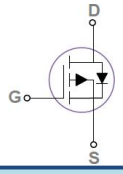
60V P-Channel MOSFET

BV_{DSS} -60V

$R_{DS(ON)}$ 48mΩ(max.)@ V_{GS}=10V

$R_{DS(ON)}$ 65mΩ(max.)@ V_{GS}=4.5V

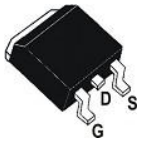
I_D -16A



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.

TO-252



Applications

- Motor Drive
- Power Tool
- LED Application

Features

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

Absolute Maximum Ratings (T_A=25°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°C	I_D	-16	A
Drain Current-Continuous @ T_C=100°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°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	BV_{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	gfs	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 ≦ 300us , duty cycle ≦ 2%.**
3. **Essentially independent of operating temperature**

60V P-Channel MOSFET

Typical Operating Characteristics

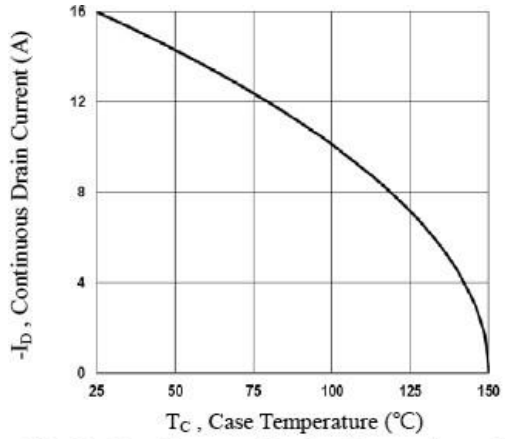


Fig.1 Continuous Drain Current vs. T_C

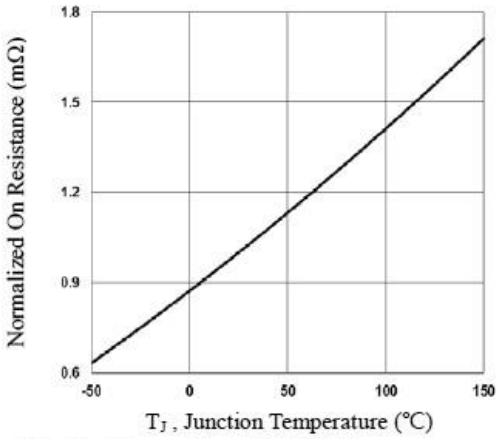


Fig.2 Normalized RDSON vs. T_J

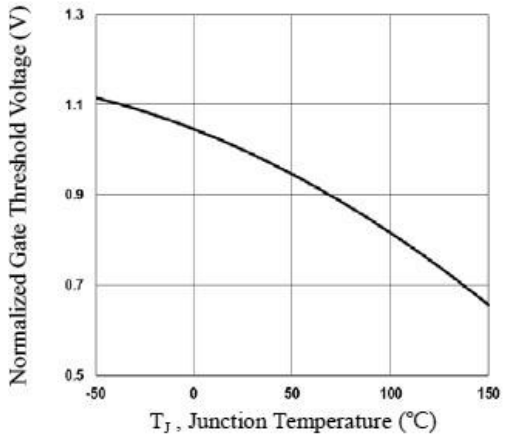


Fig.3 Normalized V_{th} vs. T_J

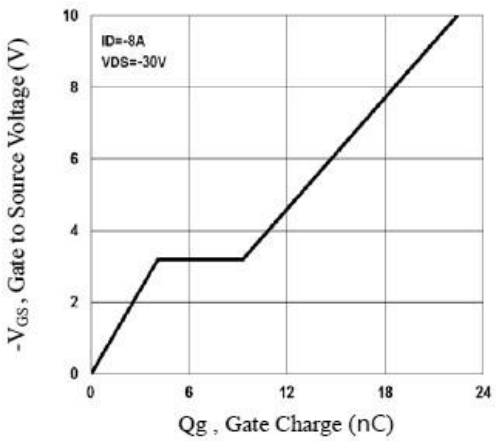


Fig.4 Gate Charge Waveform

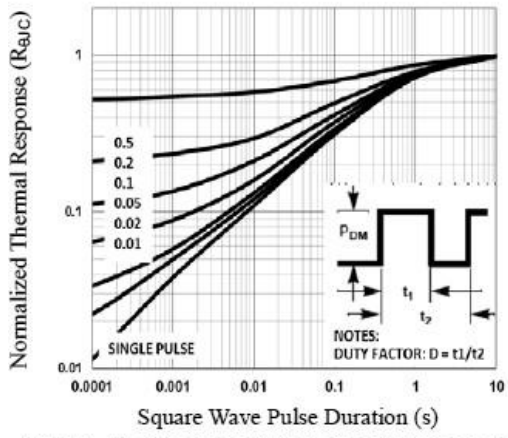


Fig.5 Normalized Transient Impedance

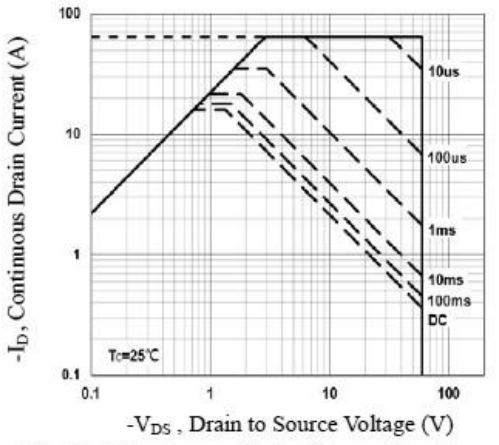


Fig.6 Maximum Safe Operation Area

60V P-Channel MOSFET

Typical Operating Characteristics (Cont.)

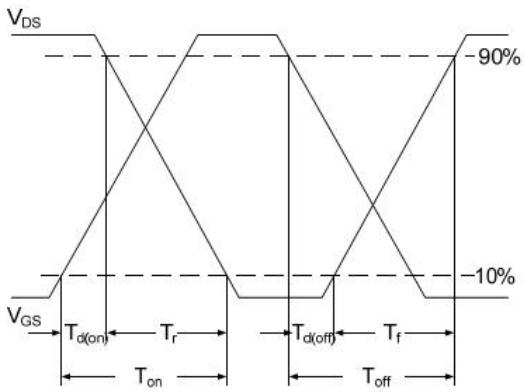


Fig.7 Switching Time Waveform

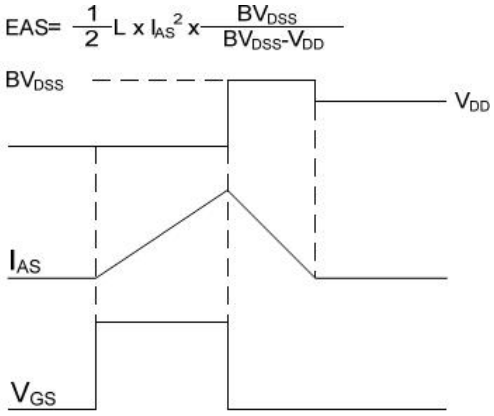


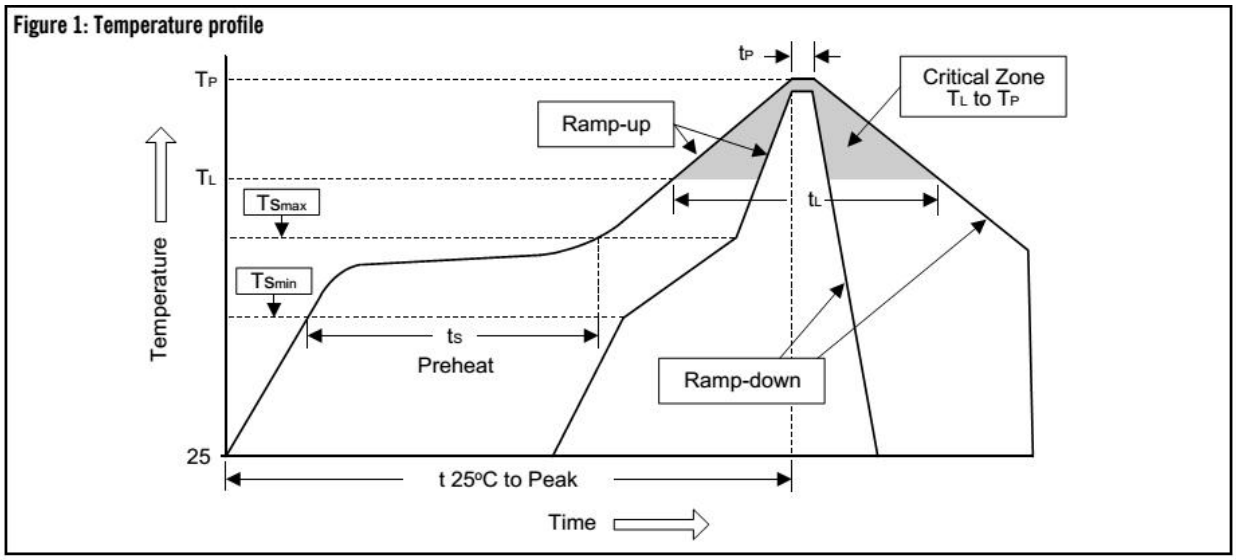
Fig.8 EAS Waveform

60V P-Channel MOSFET

Soldering Methods for RA Product

1. Storage environment: Temperature=10°C to35°C Humidity=65%±15%
2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



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 (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60 to 120 sec	 150°C 200°C 60 to 180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60 to 150 sec	 217°C 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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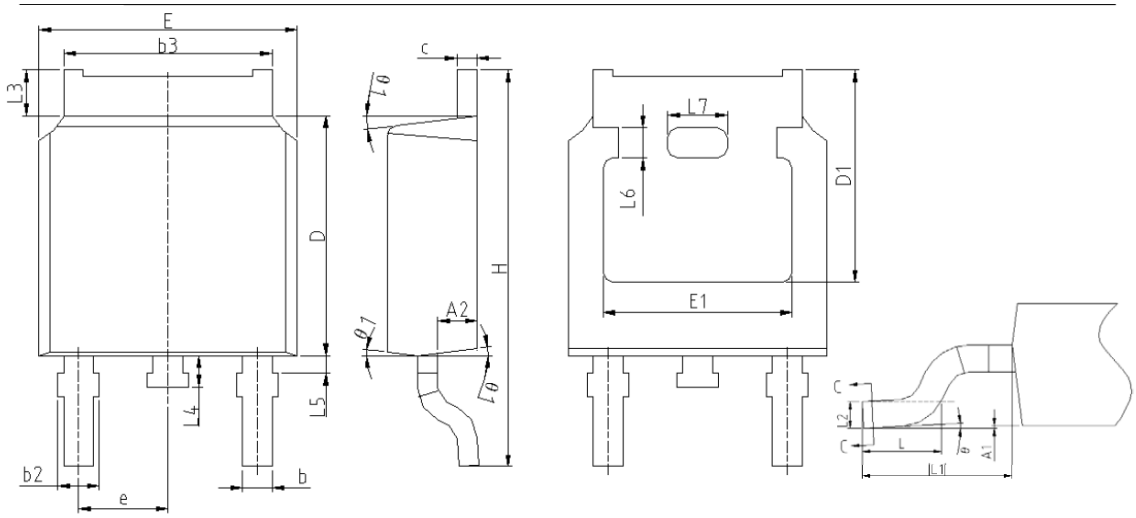
PACKAGE DIMENSION



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