

General Description

The 5 P 0 6 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 wide variety of applications

Features

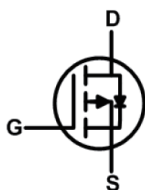
- Low Gate Charge
- High Power and current handling capability
- Lead free product is acquired

Application

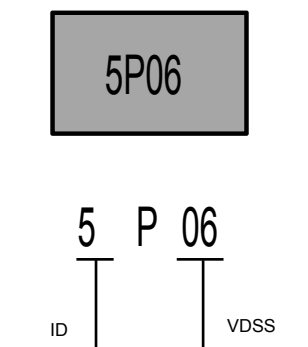
- PWM Applications
- Load Switch
- Power Management

V_{DSS} -60 V
 I_D -5.0 A
 $R_{DS(ON)}$ 110 m Ω

Equivalent Circuit



SOT-89-3L top view



MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

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

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage ($V_{GS}=0V$)	-60	V
V_{GS}	Gate-Source Voltage ($V_{DS}=0V$)	± 20	V
I_D	Drain Current-Continuous($T_A=25^\circ\text{C}$)	-5	A
	Drain Current-Continuous($T_A=100^\circ\text{C}$)	-1.5	A
I_{DM} (pulse)	Drain Current-Continuous@ Current-Pulsed (Note 1)	-10	A
P_D	Maximum Power Dissipation($T_A=25^\circ\text{C}$)	1.8	W
	Maximum Power Dissipation($T_A=100^\circ\text{C}$)	0.7	W
E_{AS}	Avalanche energy (Note 2)	30	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	$^\circ\text{C}$

Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		73	$^\circ\text{C/W}$

Electrical Characteristics T_J=25℃ unless otherwise specified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V I _D =-250μA	-60			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} =-60V, V _{GS} =0V T _J =25°C			-1	μA
		V _{DS} =-60V, V _{GS} =0V T _J =125°C			-100	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} =±20V, V _{DS} =0V			±100	nA
V _{GS(th)}	Gate Threshold Voltage	V _{DS} =V _{GS} , I _D =-250μA	-2.5		-1	V
g _{FS}	Forward Transconductance	V _{DS} =-5V, I _D =-1.5A		4.3		S
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-10V, I _D =-1.5A T _J =25°C		110	157	mΩ
R _{DS(ON)}	Drain-Source On-State Resistance	V _{GS} =-4.5V, I _D =-1A T _J =25°C		140	182	mΩ
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} =-30V,V _{GS} =0V, f=1.0MHz		971		pF
C _{oss}	Output Capacitance			418		pF
C _{rss}	Reverse Transfer Capacitance			338		pF
R _g	Gate resistance	V _{GS} =0V, V _{DS} =0V, f=1.0MHz		9.9		Ω
Switching Parameters						
t _{d(on)}	Turn-on Delay Time	V _{GS} =-10V, V _{DS} =-30V, R _L =20Ω, R _{GEN} =3Ω		7		nS
t _r	Turn-on Rise Time			20		nS
t _{d(off)}	Turn-Off Delay Time			16		nS
t _f	Turn-Off Fall Time			24		nS
Q _g	Total Gate Charge	V _{GS} =-10V, V _{DS} =-30V, I _D =-1.5A		10		nC
Q _{gs}	Gate-Source Charge			2		nC
Q _{gd}	Gate-Drain Charge			1.6		nC
Source-Drain Diode Characteristics						
I _{SD}	Source-Drain Current (Body Diode)				-5	A
V _{SD}	Forward on Voltage (Note 3)	V _{GS} =0V, I _S =-1.5A			1.2	V
t _{rr}	Reverse Recovery Time	I _F =-1.5A, dI/dt=100A/μs		12		ns
Q _{rr}	Reverse Recovery Charge	I _F =-1.5A, dI/dt=100A/μs		6		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.

Notes 2.E_{AS} condition: T_J=25℃, V_{DD}=-40V, V_G=10V, R_g=25Ω, L=0.5mH.

Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

RATING AND CHARACTERISTIC CURVES

Figure 1. Output Characteristics

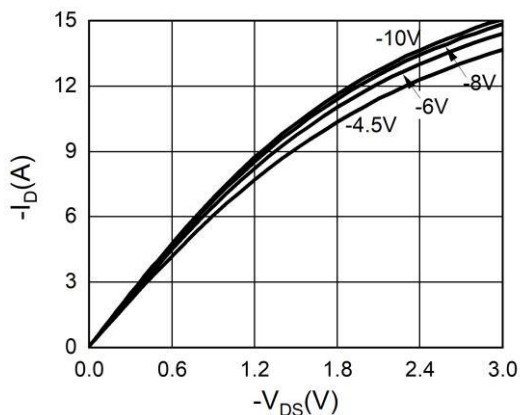


Figure 2. Transfer Characteristics

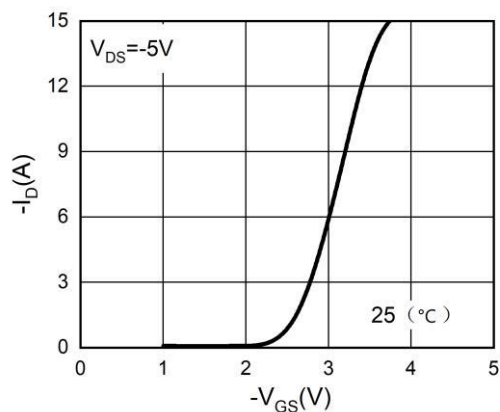


Figure 3. Power Dissipation

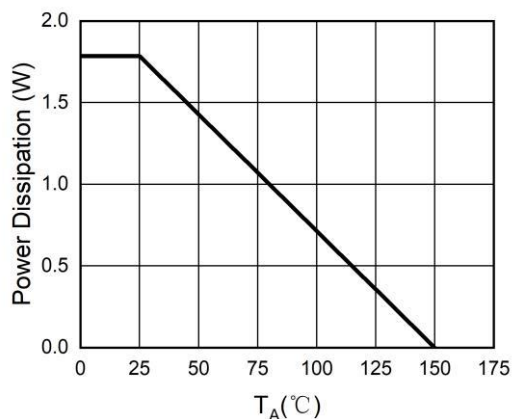


Figure 4. Drain Current

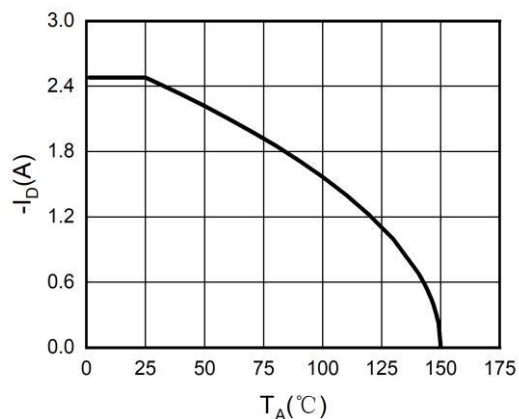


Figure 5. BV_{DSS} vs Junction Temperature

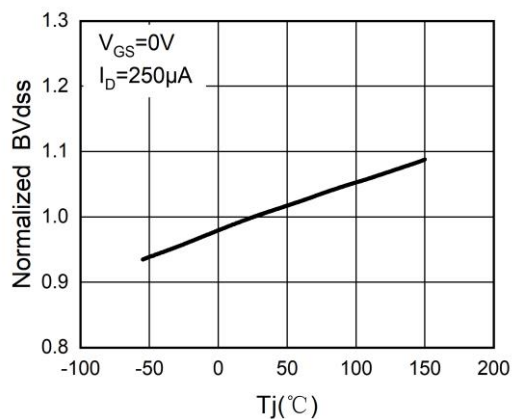
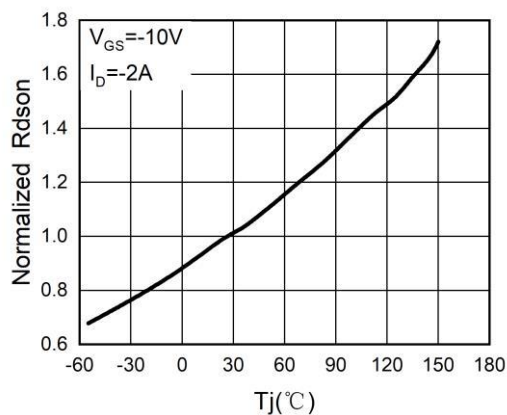


Figure 6. $R_{DS(ON)}$ vs Junction Temperature



RATING AND CHARACTERISTIC CURVES

Figure 7. Gate Charge Waveforms

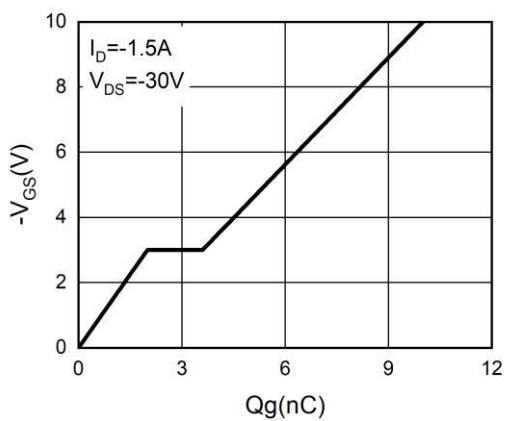


Figure 8. Capacitance

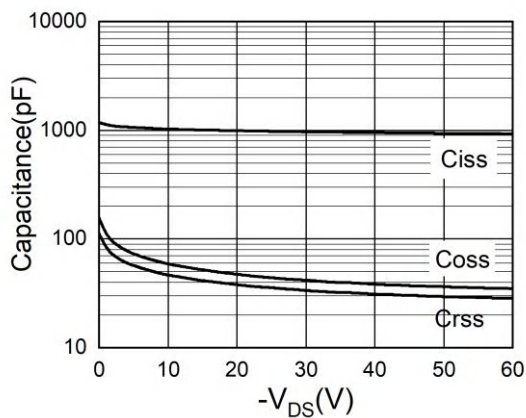


Figure 9. Body-Diode Characteristics

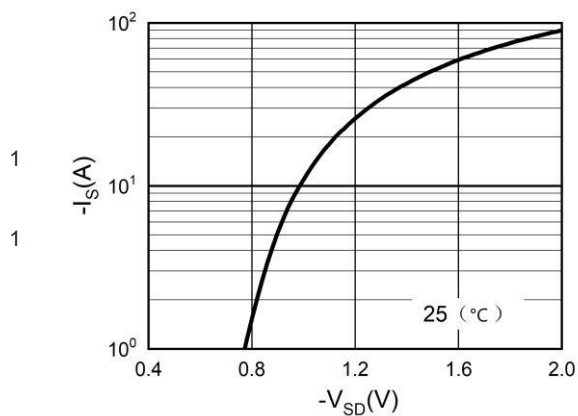
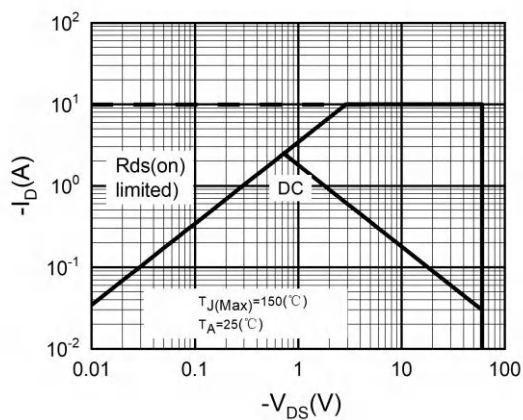
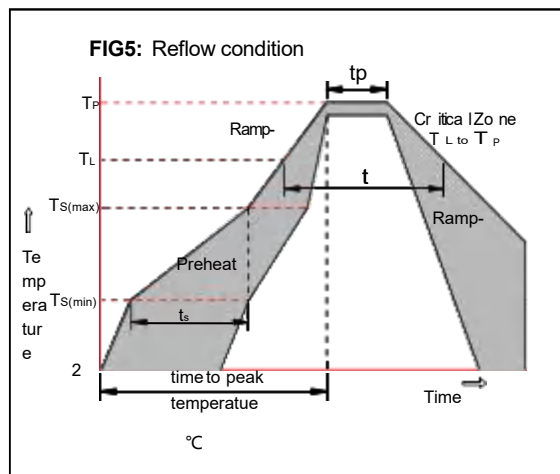


Figure 10. Maximum Safe Operating Area



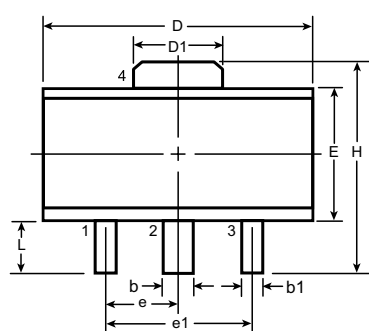
Soldering parameters

Reflow Condition		Pb-Free assembly (see as below)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150 °C
	-Temperature Max($T_{s(max)}$)	+200 °C
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3 °C/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3 °C/sec. Max
Reflow	-Temperature(T_L)(Liquid us)	+217 °C
	-Temperature(t_L)	60-150 secs.
Peak Temp (T_P)		+260(+0/-5) °C
Time within 5 °C of actual Peak Temp (t_P)		30 secs. Max
Ramp-down Rate		6 °C/sec. Max
Time 25 °C to Peak Temp (T_P)		8 min. Max
Do not exceed		+260 °C

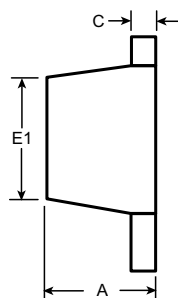


Package Dimensions & Suggested Pad Layout

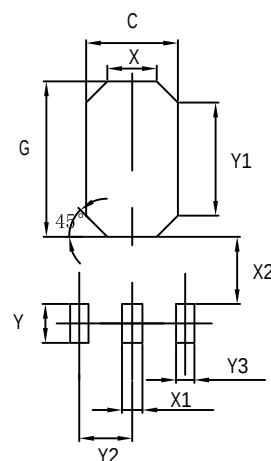
SOT89



Top View



Side View

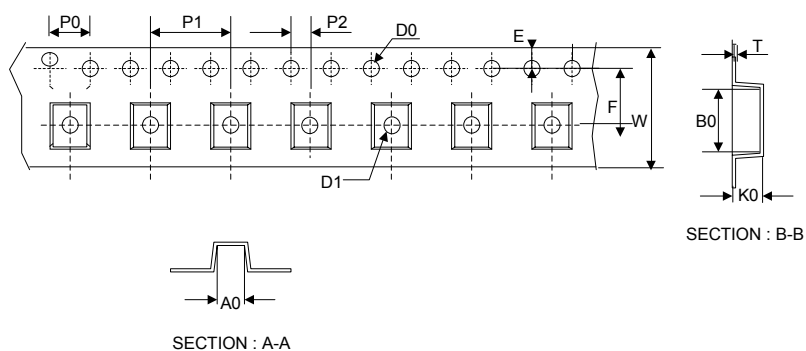


Symbol	A	b	b1	C	D	D1	E	E1	e	e1	H	L
MIN	1.40	0.44	0.36	0.3	4.40	1.50	2.29	2.00*	1.50	3.00	3.94	0.89
NOM	-	-	-	-	-	-	-	-	-	-	-	-
MAX	1.60	0.56	0.48	0.5	4.60	1.75	2.60	2.29	-	-	4.25	1.20

Dimensions	Value (in mm)
C	2.50
G	3.60
X	1.40
X1	0.90
X2	0.90
Y	1.40
Y1	2.60
Y2	1.50
Y3	0.90

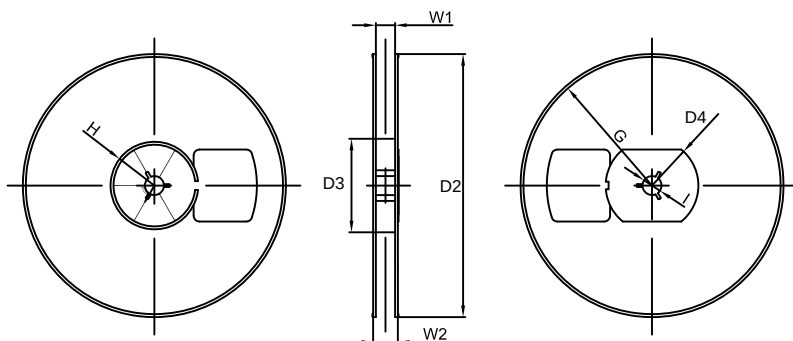
Tape & reel specification

Tape



Symbol	Dimension (mm)
P0	4.00±0.20
P1	8.00±0.20
P2	2.00±0.20
D0	1.60±0.20
D1	1.60±0.20
E	1.75±0.20
F	7.50±0.15
W	16.00±0.20
A0	6.30±0.20
B0	8.25±0.20
K0	2.60±0.20
T	0.23±0.10

13" Reel



D2	180.0±5.0
D3	60Min.
D4	R32.0±2.0
G	R86.5±2.0
H	R30.0±2.0
I	13.0±2.0
W1	13.20±2.0
W2	16.50±2.0

Quantity: 1000PCS