General Description

The 5 P 10 uses advanced trench technology to to provide excellent $R_{DS(ON)}$, low gate charge and and operation with gate voltages as low as -4.5V. This device is suitable for use as a wide variety of applications

V_{DSS} -100V
I_D -5.0 A
$R_{DS(ON)}$ 278mΩ

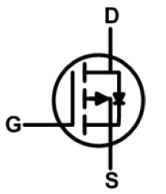
Features

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

Application

- PWM Applications
- Load Switch
- Power Management

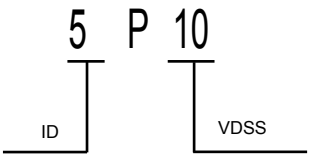
Equivalent Circuit





SOT-89-3L top view





MAXIMUM RATINGS AND ELECTRICAL CHARACTERISTICS

Absolute Maximum Ratings (T_A=25℃ unless otherwise noted)

Symbol	Parameter	Limit	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V)	-100	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±20	V
I_D	Drain Current-Continuous(T_A=25℃)	-5	A
	Drain Current-Continuous(T_A=100℃)	-1.2	A
$I_{DM\ (pluse)}$	Drain Current-Continuous@ Current-Pulsed (Note 1)	-8	A
P_D	Maximum Power Dissipation(T_A=25℃)	3.1	W
	Maximum Power Dissipation(T_A=100℃)	1.25	W
E_{AS}	Avalanche energy (Note 2)	109	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55 To 150	℃

Thermal Characteristic

Symbol	Parameter	Typ	Max	Unit
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient		40	℃/W

Electrical Characteristics T_J=25℃ unless otherwise s ecified

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=-250μA	-100			V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=-100V, V_{GS}=0V T_J=25℃			-1	μA
		V_{DS}=-100V, V_{GS}=0V T_J=125℃			-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	-1		-2.5	V
g_{FS}	Forward Transconductance	V_{DS}=-5V, I_D=-1A		10		S
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-10V, I_D=-1A T_J=25℃		278	361	mΩ
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V, I_D=-1A T_J=25℃		297	395	mΩ
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS}=-50V,V_{GS}=0V, f=1.0MHz		1198		pF
C_{oss}	Output Capacitance			33.6		pF
C_{rss}	Reverse Transfer Capacitance			28.3		pF
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, f=1.0MHz		5.1		Ω
Switching Parameters						
$t_{d(on)}$	Turn-on Delay Time	V_{GS}=-10V, V_{DS}=-50V, R_L=50Ω, R_{GEN}=3Ω		132		nS
t_r	Turn-on Rise Time			3.7		nS
$t_{d(off)}$	Turn-Off Delay Time			41		nS
t_f	Turn-Off Fall Time			6.2		nS
Q_g	Total Gate Charge	V_{GS}=-10V, V_{DS}=-50V, I_D=-1A		19.6		nC
Q_{gs}	Gate-Source Charge			6		nC
Q_{gd}	Gate-Drain Charge			4.2		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=-1A			-1.2	V
t_{rr}	Reverse Recovery Time	I_F=-1A, dI/dt=100A/μs		43		ns
Q_{rr}	Reverse Recovery Charge	I_F=-1A, dI/dt=100A/μs		83.8		nC

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
Notes 2.E_{AS} condition: T_J=25℃,V_{DD}=50V,V_G=-10V, Rg=25Ω, L=0.5mH.
Notes 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

RATING AND CHARACTERISTIC CURVES

Figure 1. Output Characteristics

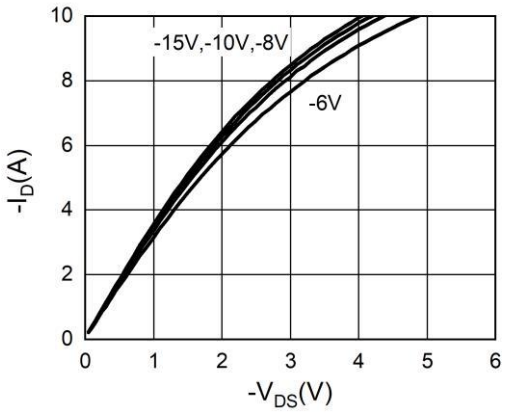


Figure 2. Transfer Characteristics

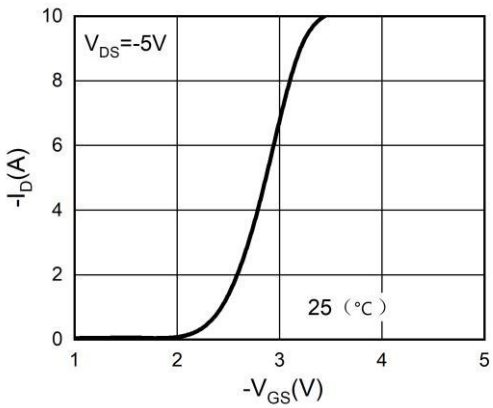


Figure 3. Power Dissipation

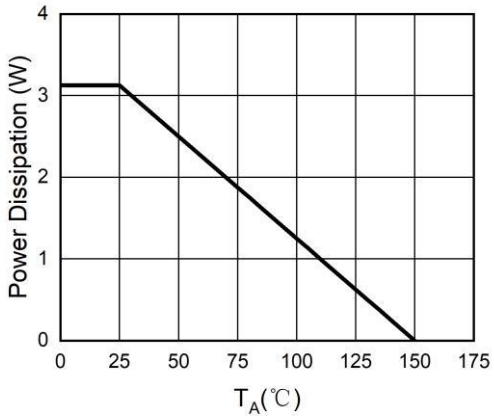


Figure 4. Drain Current

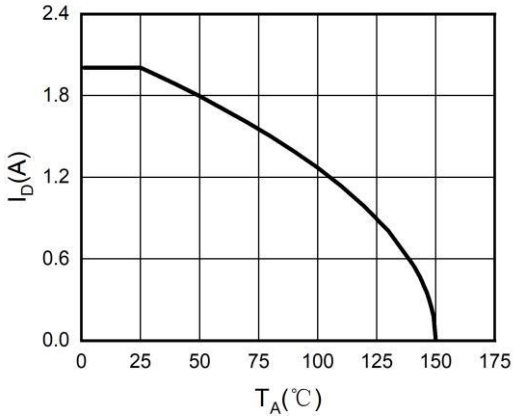


Figure 5. BV_{DSS} vs Junction Temperature

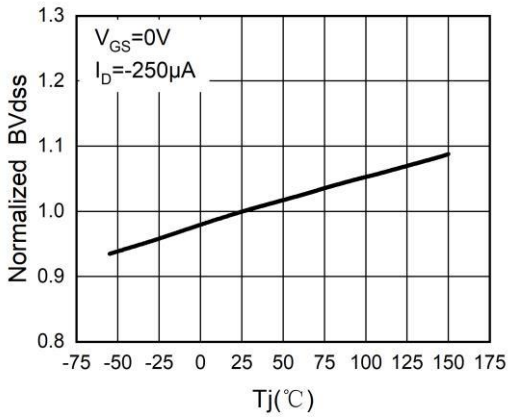
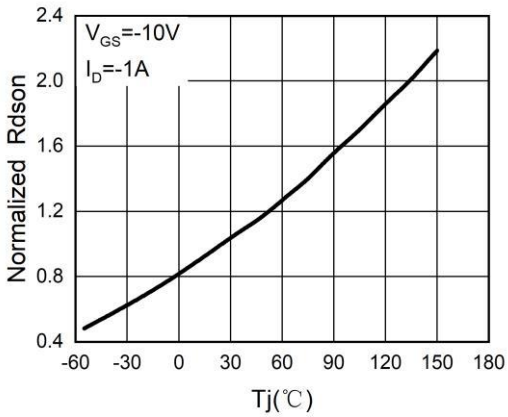


Figure 6. $R_{DS(ON)}$ vs Junction Temperature



RATING AND CHARACTERISTIC CURVES

Figure 7. Gate Charge Waveforms

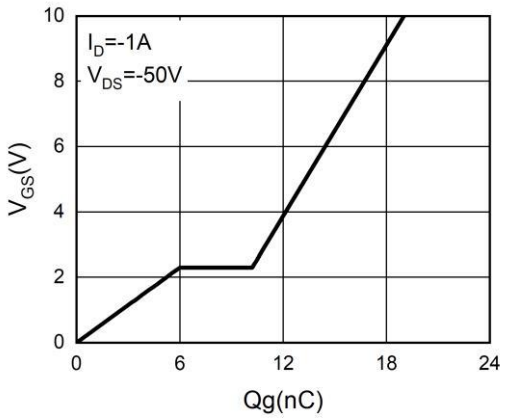


Figure 8. Capacitance

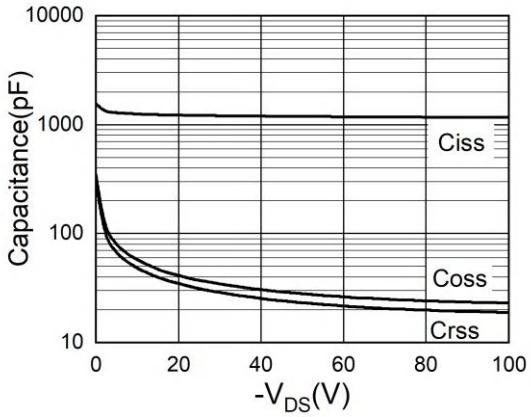


Figure 9. Body-Diode Characteristics

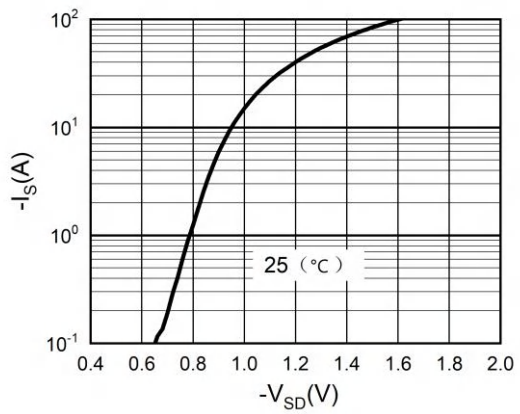
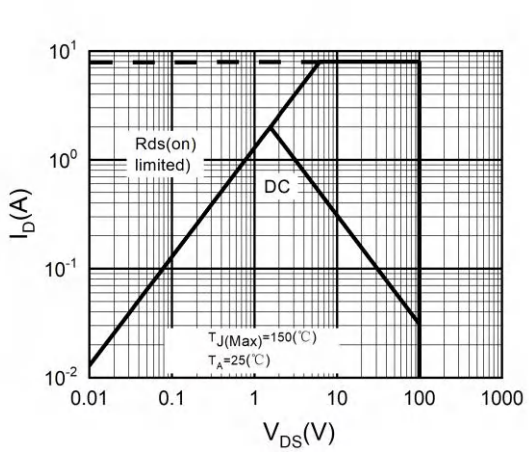


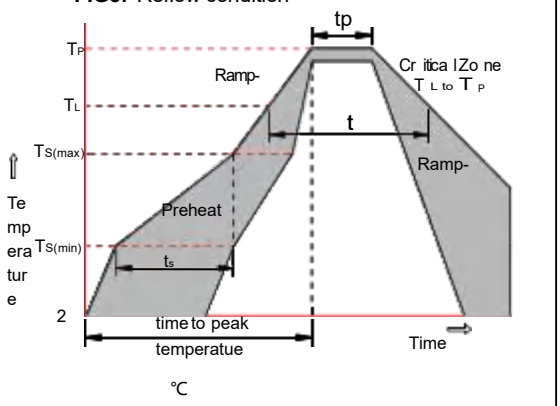
Figure 10. Maximum Safe Operating Area



Soldering parameters

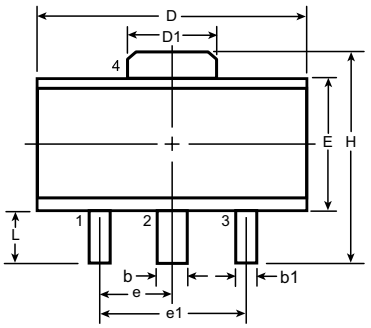
Reflow Condition		Pb-Free assembly (see as bellow)
Pre Heat	-Temperature Min ($T_{s(min)}$)	+150℃
	-Temperature Max($T_{s(max)}$)	+200℃
	-Time (Min to Max) (ts)	60-180 secs.
Average ramp up rate (Liquid us Temp (T_L) to peak)		3℃/sec. Max
$T_{s(max)}$ to T_L - Ramp-up Rate		3℃/sec. Max
Reflow	-Temperature(T_L)(Liquid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

FIG5: Reflow condition

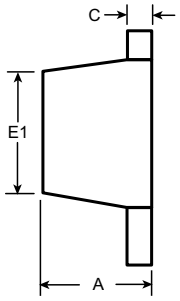


Package Dimensions & Suggested Pad Layout

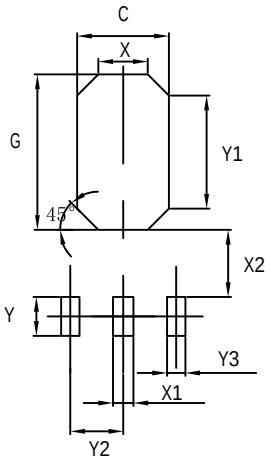
SOT89



Top View



Side View

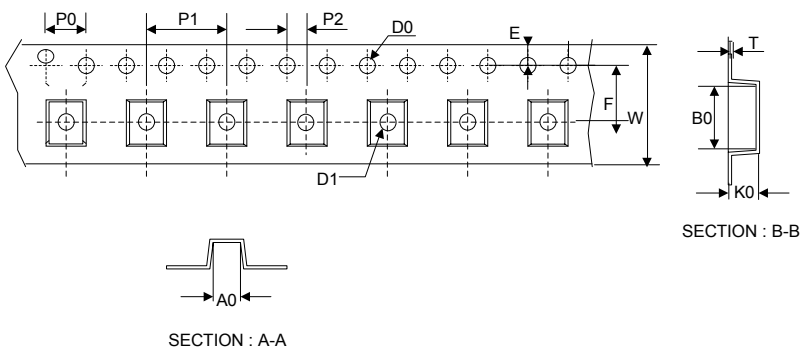


Symbol		A	b	b1	C	D	D1	E	E1	e	e1	H	L
Dimensions (mm)	MIN	1.40	0.44	0.36	0.3	4.40	1.50	2.29	2.00	1.50 BSC	3.00 BSC	3.94	0.89
	NOM	-	-	-	-	-	-	-	-			-	-
	MAX	1.60	0.56	0.48	0.5	4.60	1.75	2.60	2.29			4.25	1.20

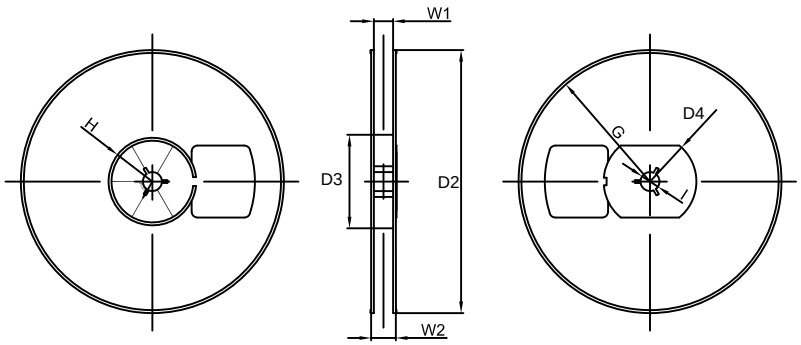
Dimensions	Value (in mm)
C	2.50
G	3.60
X	1.40
X1	0.90
X2	0.90
Y	1.40
Y1	2.60
Y2	1.50
Y3	0.90

Tape & rell specification

Tape



13” Reel



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
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	