

DESCRIPTION

The MX05N04S uses advanced trench technology to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications.

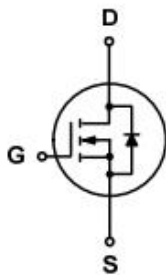
GENERAL FEATURES

- $V_{DS}=40V$, $I_D=5.8A$
 $R_{DS(ON)}(Typ.)=23m\Omega$ @ $V_{GS}=10V$
 $R_{DS(ON)}(Typ.)=32m\Omega$ @ $V_{GS}=4.5V$
- Surface-mounted package
- Advanced trench cell design

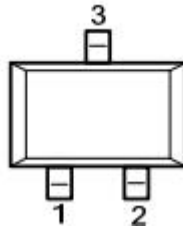
APPLICATION

- Portable appliances
- Battery management
- High speed switch
- Low power DC-DC converter

PINOUT



Schematic diagram



SOT23-3L top view

Pin	Description
1	Gate(G)
2	Source(S)
3	Drain(D)

ORDERING INFORMATION

Part Number	Storage Temperature	Package	Devices Per Reel
MX05N04S	-55°C to 150°C	SOT23-3L	3000

ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current ($V_{GS}=10V$) ^(Note1)	I_D	5.8	A
Drain Current ($V_{GS}=10V$, $T_A=100^\circ C$) ^(Note1)	I_D	3.6	A
Pulsed Drain Current ($V_{GS}=10V$) ^{(Note1)(Note2)}	I_{DM}	23.2	A
Continuous-Source Current	I_S	5.8	A
Total Power Dissipation ^(Note1)	P_{tot}	1.4	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Thermal Resistance, Junction-to-Ambient ^(Note1)	$R_{\theta JA}$	90	°C/W

Note 1. Surface Mounted on 1 in² pad area, $t \leq 10$ sec

Note 2. Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$



ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=32V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	-	2	V
Drain-Source On-State Resistance ^(Note1)	$R_{DS(on)}$	$V_{GS}=10V, I_D=4A$	-	23	26	m Ω
		$V_{GS}=4.5V, I_D=2A$	-	32	40	m Ω
Dynamic Characteristics^(Note2)						
Input Capacitance	C_{iss}	$V_{DS}=20V, V_{GS}=0V, F=1.0MHz$	-	638	-	pF
Output Capacitance	C_{oss}		-	51	-	pF
Reverse Transfer Capacitance	C_{rss}		-	45	-	pF
Switching Characteristics^(Note2)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS}=20V, I_{DS}=4A, V_{GEN}=10V, R_G=3.9\Omega, R_L=5\Omega,$	-	4.9	-	nS
Turn-on Rise Time	t_r		-	10	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	16	-	nS
Turn-Off Fall Time	t_f		-	6.6	-	nS
Total Gate Charge	Q_g	$V_{DS}=20V, I_{DS}=4A, V_{GS}=10V$	-	13	-	nC
Gate-Source Charge	Q_{gs}		-	2.9	-	nC
Gate-Drain Charge	Q_{gd}		-	2	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note1)	V_{SD}	$V_{GS}=0V, I_{SD}=4A$	-	-	1.3	V
Reverse Recovery Time	t_{rr}	$I_{SD}=4A, dI_{SD}/dt=100A/\mu s$	-	8.1	-	nS
Reverse Recovery Charge	Q_{rr}		-	4.3	-	nC

Note 1. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$

Note 2. Guaranteed by design, not subject to production testing

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Power Capability

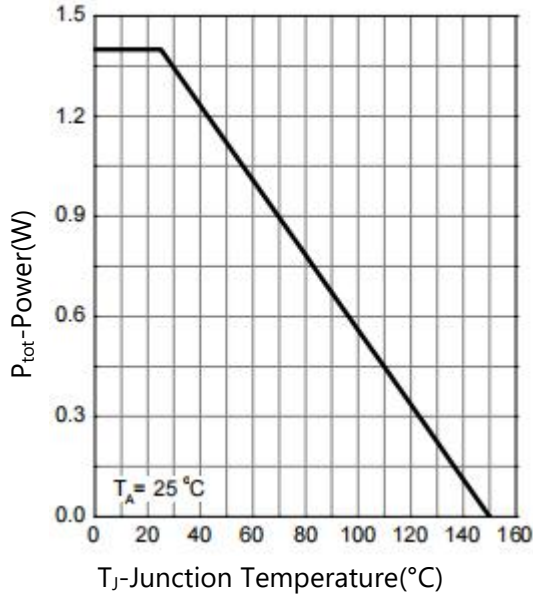


Figure 2. Current Capability

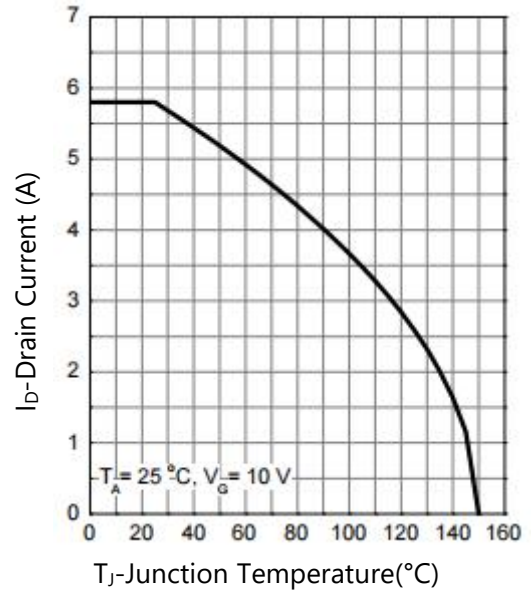


Figure 3. Safe Operation Area

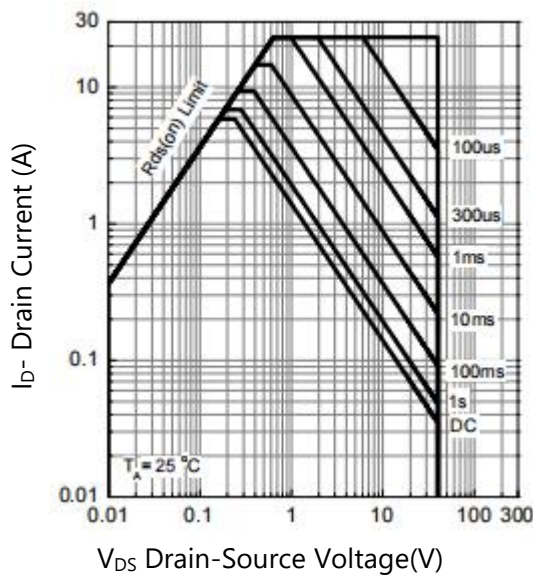
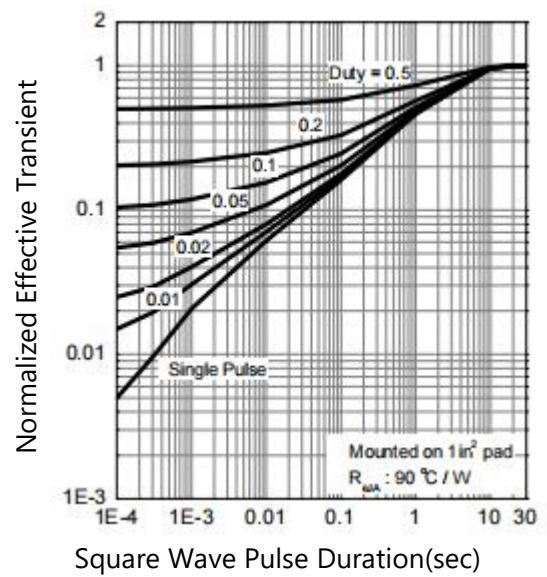


Figure 4. Transient Thermal Impedance





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 5. Output Characteristics

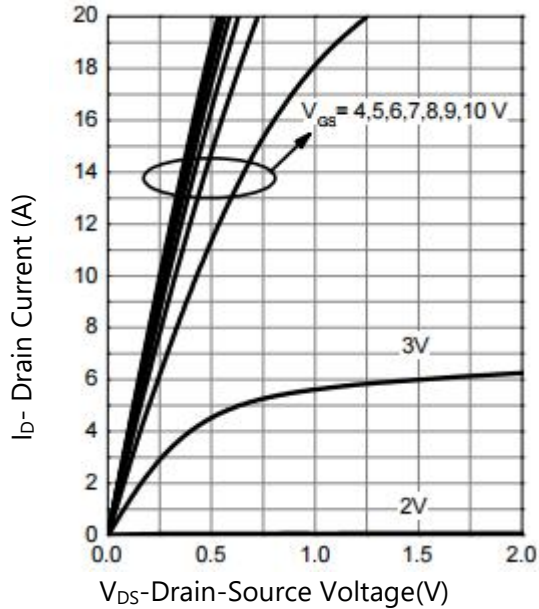


Figure 6. Drain-Source On Resistance

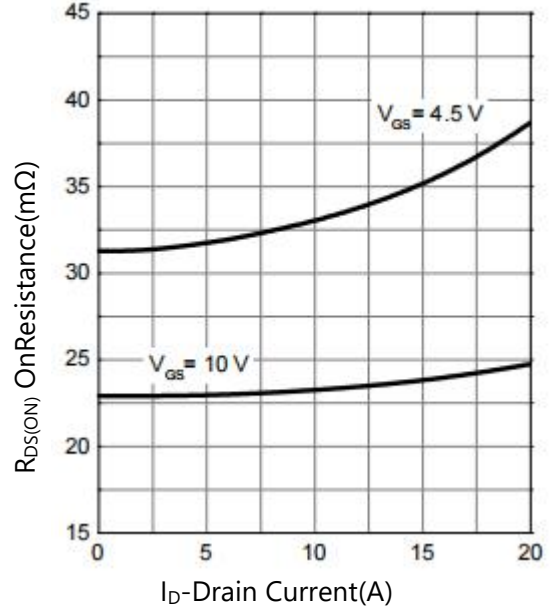


Figure 7. Transfer Characteristics

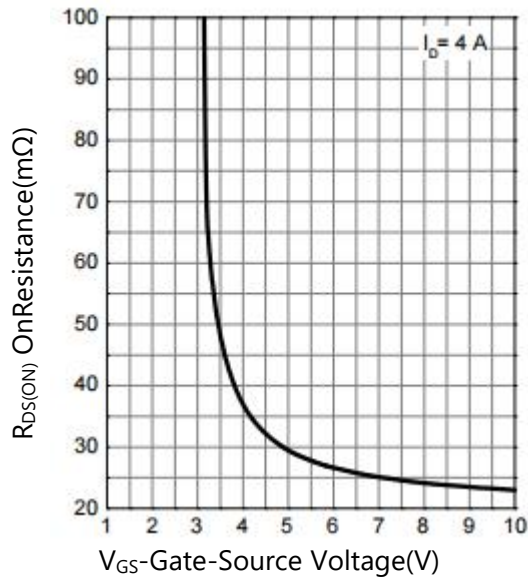
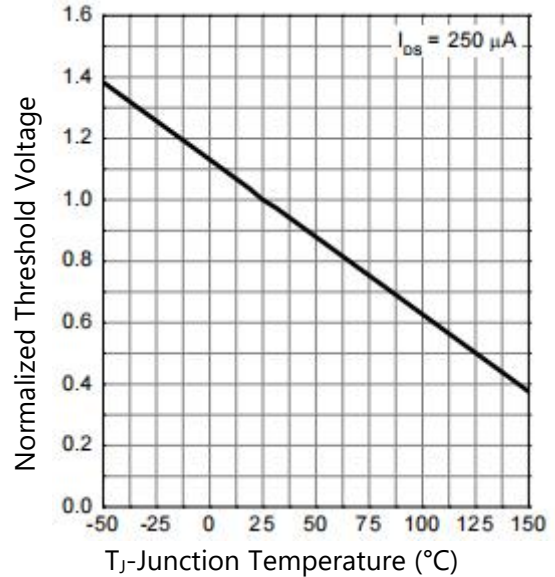


Figure 8. Normalized Threshold Voltage





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 9. Normalized On Resistance

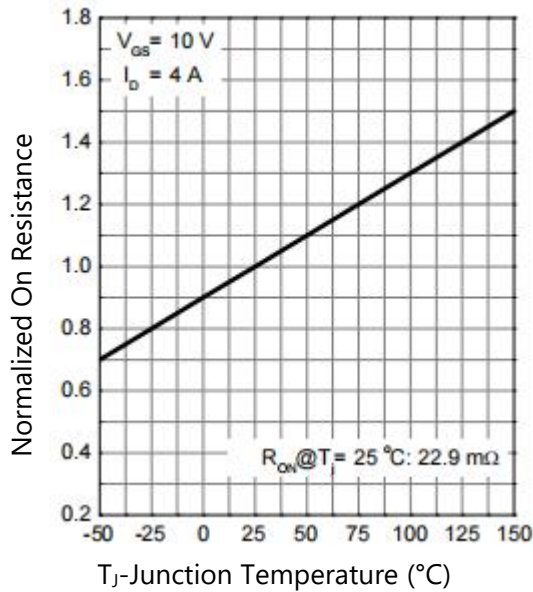


Figure 10. Diode Forward Current

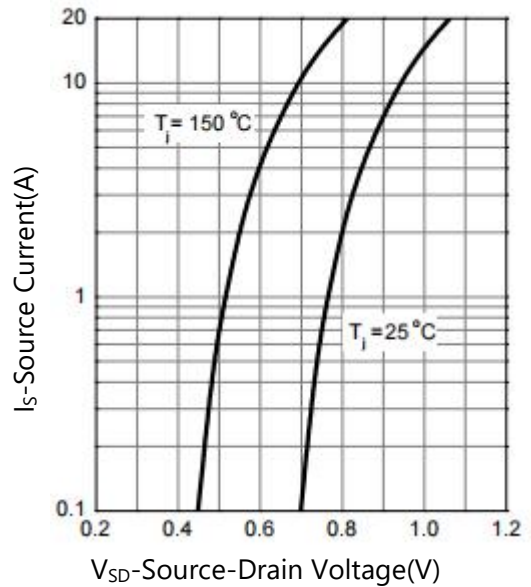


Figure 11. Capacitance

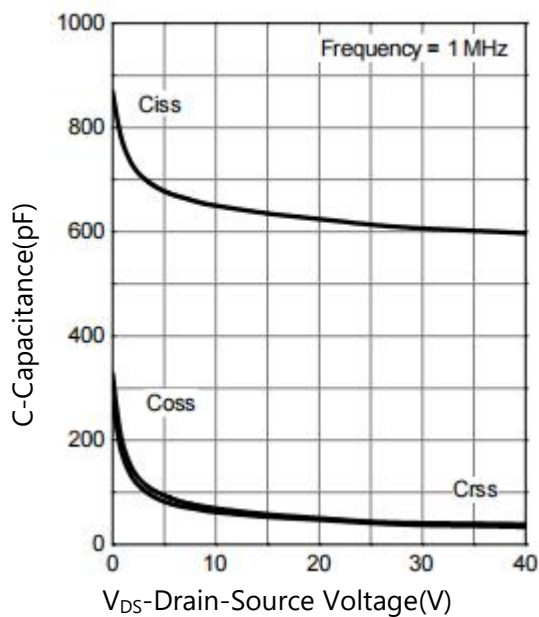
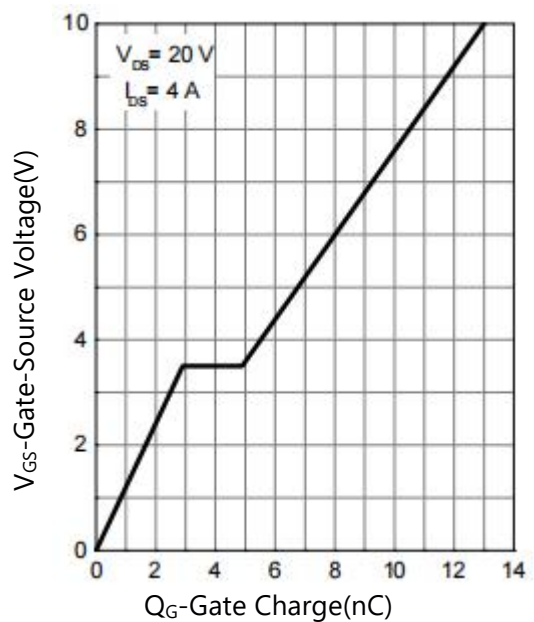
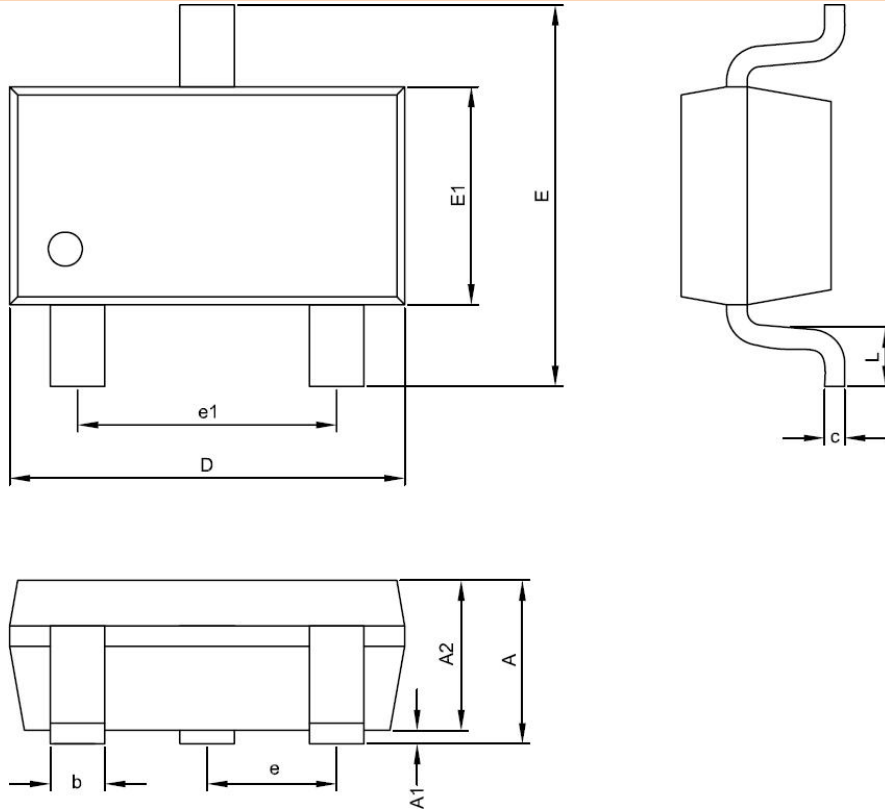


Figure 12. Gate Charge



PACKAGE INFORMATION

SOT23-3L



Symbol	Dimensions In Millimeters	
	MIN.	MAX.
A	1.00	1.45
A1	0.00	0.15
A2	1.00	1.30
D	2.70	3.10
E	2.60	3.00
E1	1.50	1.70
c	0.08	0.25
b	0.30	0.50
e	0.95 BSC	
e1	1.90 BSC	
L	0.30	0.60