MOSFETs Silicon 60V P-Channel MOS

■ Applications

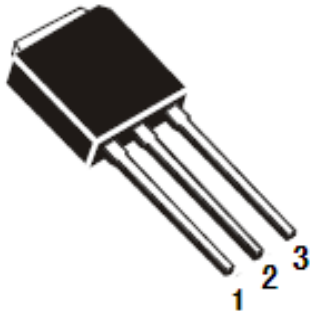
- Synchronus Rectification
- Industrial and Motor Drive
- DC/DC and AC/DC Converters
- Power Tools

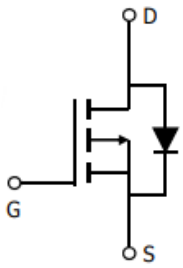
■ Features

- High-Speed Switching
- Low $R_{DS(ON)}$
- Capable of 4.5 V Gate Drive
- Good stability and uniformity with high EAS
- RoHS and Halogen-Free Compliant
- 100% UIS and RG Tested

■ Product Summary

V_{DS}	-60	V
I_D	-18	A
$R_{DS(ON),Typ}$@10V	80	mΩ
$R_{DS(ON),Typ}$@4.5V	95	mΩ
Q_g	17	nC





Gate： 1
Drain： 2
Source： 3

TO-251

Marking	Package	Packaging	Min. package quantity
MJ090P060TL	TO-251	Tube	2400

■ Absolute Maximum Ratings（Tc=25℃ unless otherwise noted)

Parameter			Symbol	Ratings	Unit
Drain-Source Voltage			V_{DS}	-60	V
Gate-Source Voltage			V_{GS}	±20	V
Continuous Drain Current	Tc=25℃	(Note 1)	I_D	-18	A
Continuous Drain Current	Tc=100℃	(Note 1)		-12	A
Drain Current-Pulsed		(Note 1)	I_{DM}	-60	A
Total Dissipation			P_D	31	W
Junction Temperature			T_j	150	℃
Storage Temperature			T_{stg}	-55-150	℃
Single Pulse Avalanche Energy		(Note 2)	E_{AS}	140	mJ

Note: Using continuously under heavy loads (e.g. the application of high temperature/current/voltage and the significant change in temperature, etc.) may cause this product to decrease in the reliability significantly even if the operating conditions (i.e. operating temperature/current/voltage, etc.) are within the absolute maximum ratings.

■ Thermal Characteristics

Parameter	Symbol	Max	Unit
Maximum Junction-to-Case	$R_{\theta JC}$	4	℃/W
Maximum Junction-to-Ambient	$R_{\theta JA}$	60	℃/W

Note 1：Ensure that the channel temperature does not exceed 150℃.

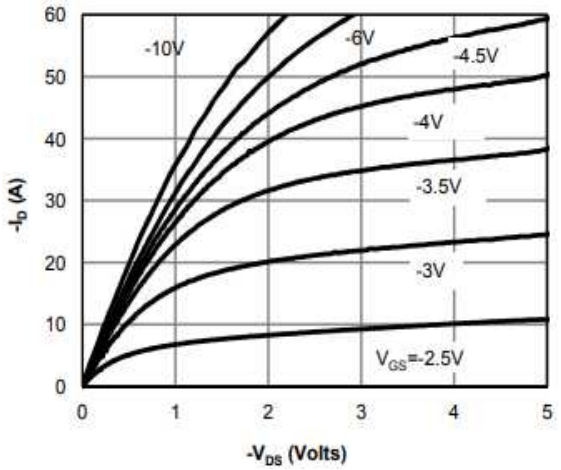
Note 2：V_{DD}=50V, T_{ch}= 25℃(initial), L=0.1mH, R_g=25Ω.

Note：This transistor is sensitive to electrostatic discharge and should be handled with care.

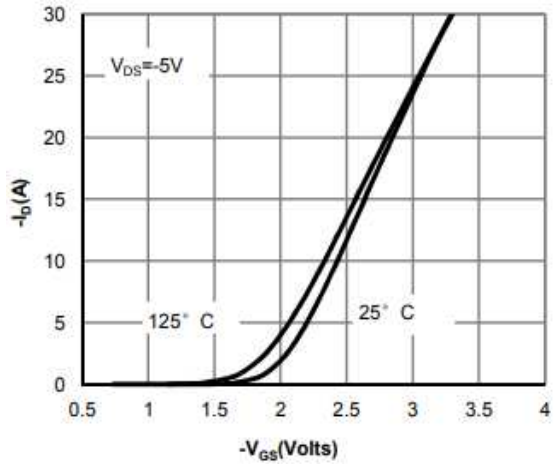
■ Electrical Characteristics（Tc=25℃ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V,I_D=-250uA	-60	-	-	V
Drain-Source Leakage Current	I_{DSS}	V_{DS}=-60V,V_{GS}=0V	-	-	-1	uA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS}=V_{DS},I_D=-250uA	-1	-1.5	-2.2	V
Drain-Source On Resistance	$R_{DS(ON)}$	V_{GS}=-4.5V,I_D=-8A	-	95	120	mΩ
		Tj=125℃	-	142	-	
		V_{GS}=-10V,I_D=-10A	-	80	90	
		Tj=125℃	-	132	-	
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=-35V,V_{GS}=0V, f=1.0MHz	-	930	1250	pF
Output Capacitance	C_{oss}		-	40	75	pF
Reverse Transfer Capacitance	C_{rss}		-	30	55	pF
Gate Resistance	R_g	V_{DS}=0V,V_{GS}=0V, f=1.0MHz	-	5	8	Ω
Switching Paramters						
Turn-On Delay Time	$t_{d(on)}$	V_{DS}=-30V,I_D=-10A, V_{GS}=-10V,R_G=10Ω	-	7	-	ns
Turn-On Rise Time	t_r		-	18	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	32	-	ns
Turn-Off Fall Time	t_f		-	20	-	ns
Total Gate Charge	Q_g	V_{DS}=-30V,I_D=-10A, V_{GS}=-10V	-	17	-	nC
Gate-Source Charge	Q_{gs}		-	3.5	-	nC
Gate-Drain Charge	Q_{gd}		-	3.2	-	nC
Source-Drain Characteristics						
Diode Forward Voltage	V_{sd}	V_{GS}=0V,I_S=-10A	-	0.94	1.2	V
Reverse Recovery Time	t_{rr}	V_R=-30V,I_F=-10A, di/dt=-100A/us	-	35	-	ns
Reverse Recovery Charge	Q_{rr}		-	55	-	nC

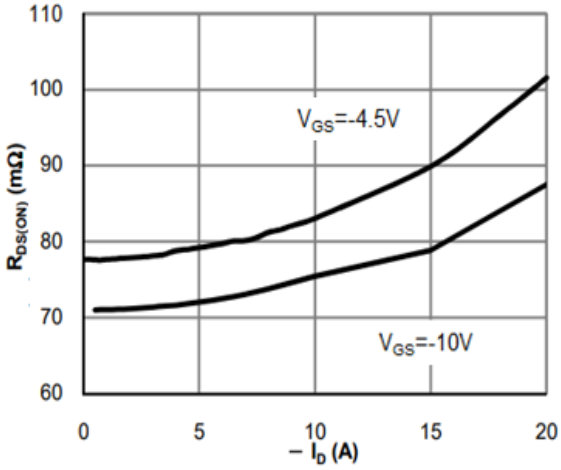
■ Characteristics Curves



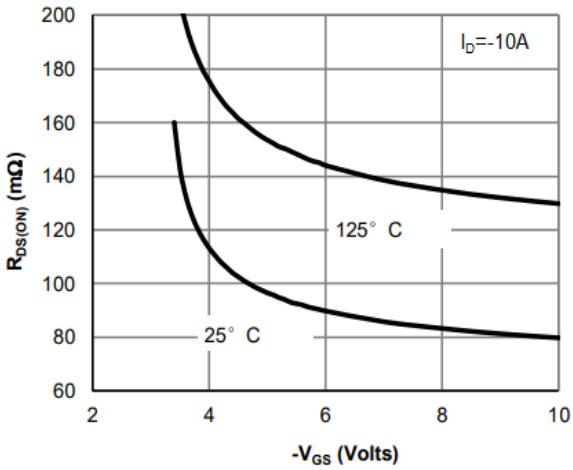
Output Characteritsics



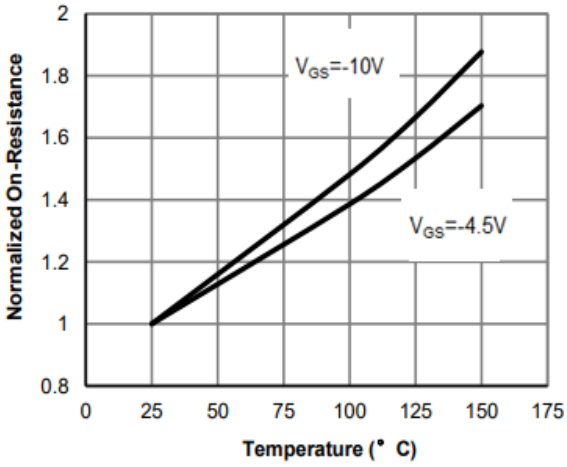
Transfer Characteritsics



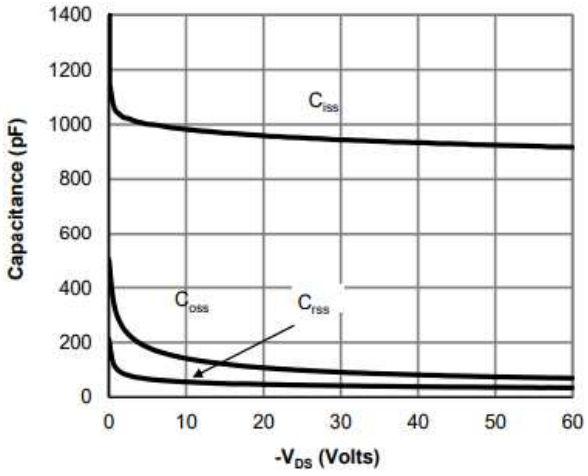
On Resistance Vs Drain Current



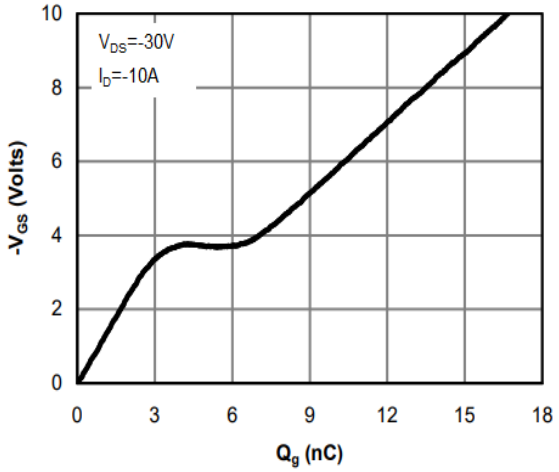
On Resistance Vs Gate Source Voltage



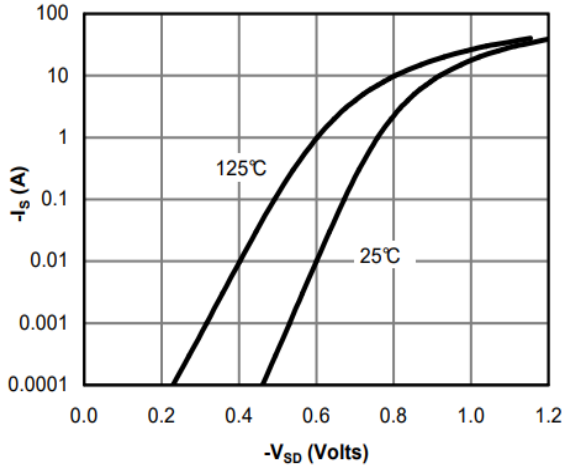
Rdson-JunctionTemperature



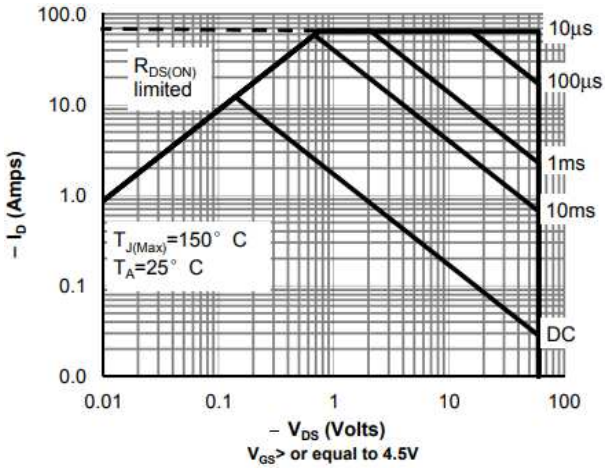
Capacitance



Gate Charge Waveform



Source-Drain Diode Forward Voltage

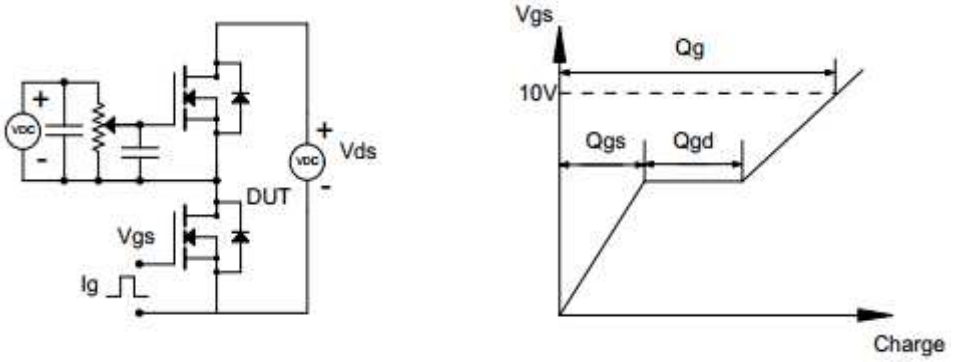


Maximum Safe Operating Area

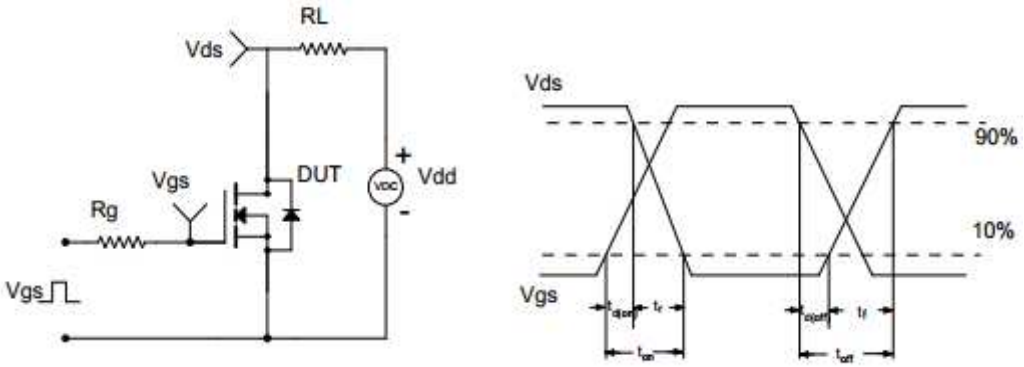
Note： The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.

■ Test Circuit & Waveform

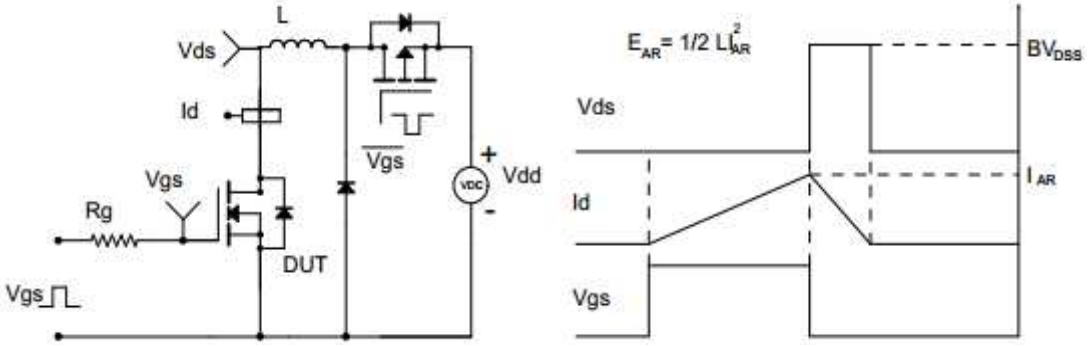
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform



■ TO-251 Package Dimensions

Unit：mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	2.10		2.50	D1	5.10		5.50
A1	0.95		1.30	E	5.80		6.30
B	0.80		1.25	e	2.25	2.30	2.35
b	0.50		0.80	L	7.70		8.50
b1	0.70		0.90	L1	1.45		1.95
C	0.45		0.60	R		0.30	
C1	0.45		0.60				
D	6.35		6.75