

MOSFETs Silicon 40V P-Channel MOS
■ Applications

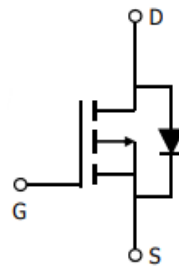
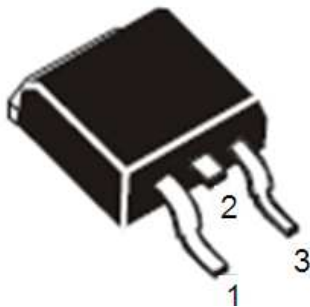
- Synchronus Rectification
- Industrial and Motor Drive
- DC/DC and AC/DC Converters
- Power Tools

■ 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}	-40	V
I_D	-175	A
$R_{DS(ON)}, Typ @ -10V$	3.3	m Ω
$R_{DS(ON)}, Typ @ -4.5V$	4.5	m Ω
Q_g	275	nC



Gate: 1
Drain: 2
Source: 3

TO-263

Marking	Package	Packaging	Min. package quantity
ML004P040TL	TO-263	Tube	1000
ML004P040TL	TO-263	Tape & Reel	800





■ Absolute Maximum Ratings (T_c=25°C unless otherwise noted)

Parameter	Symbol	Ratings	Unit
Drain-Source Voltage	V _{DS}	-40	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current T _c =25°C (Note 1)	I _D	-175	A
Continuous Drain Current T _c =100°C (Note 1)		-115	A
Drain Current-Pulsed (Note 1)	I _{DM}	-700	A
Total Dissipation	P _D	300	W
Junction Temperature	T _J	175	°C
Storage Temperature	T _{stg}	-55-175	°C
Single Pulse Avalanche Energy (Note 2)	E _{AS}	1400	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 _{θJC}	0.5	°C/W
Maximum Junction-to-Ambient (Note 3)	R _{θJA}	60	°C/W

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

Note 2: V_{DD}=30V, T_{ch}= 25°C(initial), L=0.5mH, R_g=25Ω.

Note 3: The value of R_{θJA} is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with T_A=25° C. The value in any given application depends on the user's specific board design.

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



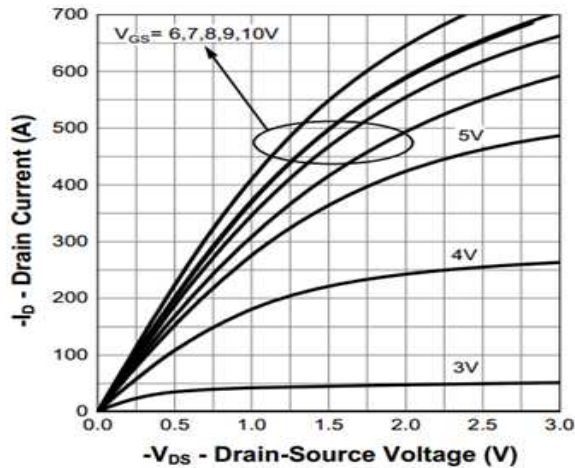
■ Electrical Characteristics (Tc=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Static Parameters						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250uA	-40	-	-	V
Drain-Source Leakage Current	I _{DSS}	V _{DS} =-40V, 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	-1.2	-1.6	-2.2	V
Drain-Source On Resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-15A	-	4.5	5.5	mΩ
		Tj=125℃	-	6.8	-	
		V _{GS} =-10V, I _D =-20A	-	3.3	4	
		Tj=125℃	-	5.1	-	
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{DS} =-35V, V _{GS} =0V, f=1.0MHz	-	15500	-	pF
Output Capacitance	C _{oss}		-	845	-	pF
Reverse Transfer Capacitance	C _{rss}		-	745	-	pF
Gate Resistance	R _g	V _{DS} =0V, V _{GS} =0V, f=1.0MHz	-	4.5	-	Ω
Switching Paramters						
Turn-On Delay Time	t _{d(on)}	V _{DS} =-20V, I _D =-20A, V _{GS} =-10V, R _G =3.9Ω	-	23	-	ns
Turn-On Rise Time	t _r		-	125	-	ns
Turn-Off Delay Time	t _{d(off)}		-	325	-	ns
Turn-Off Fall Time	t _f		-	140	-	ns
Total Gate Charge	Q _g	V _{DS} =-20V, I _D =-20A, V _{GS} =-10V	-	275	-	nC
Gate-Source Charge	Q _{gs}		-	65	-	nC
Gate-Drain Charge	Q _{gd}		-	35	-	nC
Source-Drain Characteristics						
Diode Forward Voltage	V _{sd}	V _{GS} =0V, I _S =-10A	-	-0.8	-1.2	V
Reverse Recovery Time	t _{rr}	V _R =-20V, I _F =-20A, di/dt=100A/us	-	32	-	ns
Reverse Recovery Charge	Q _{rr}		-	30	-	nC

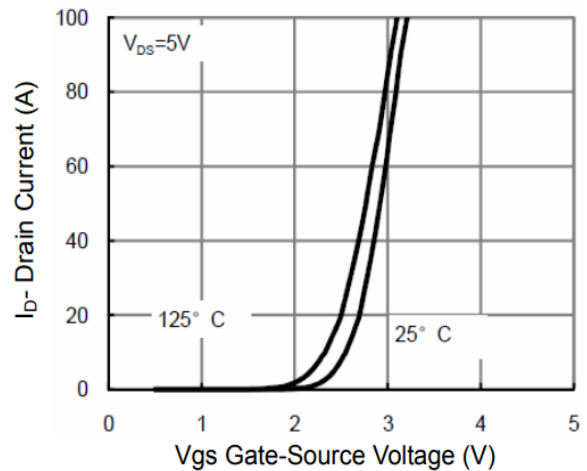




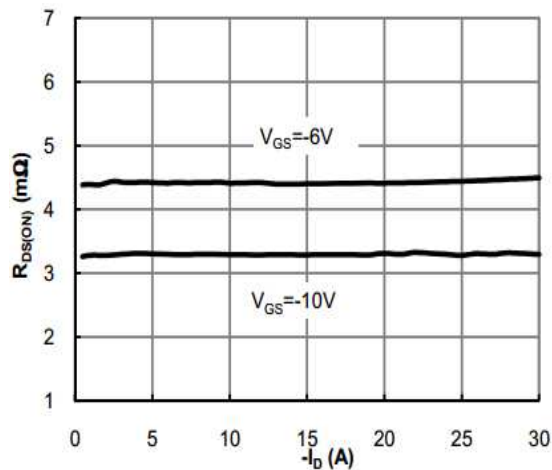
■ Characteristics Curves



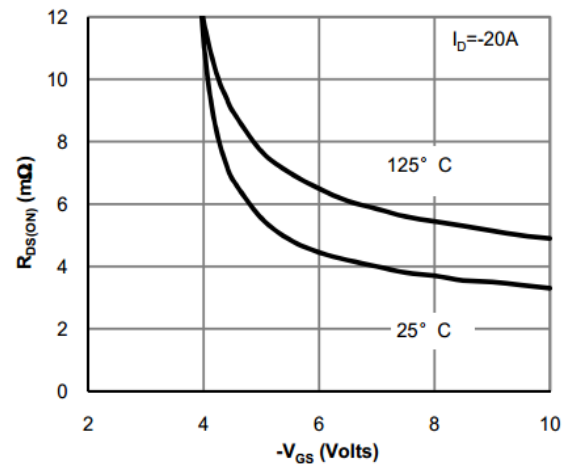
Output Characteristics



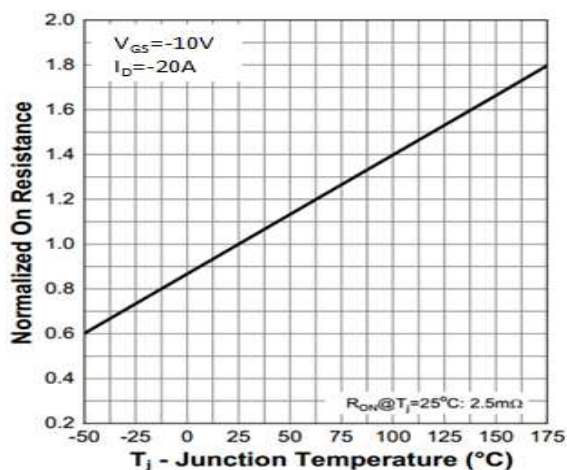
Transfer Characteristics



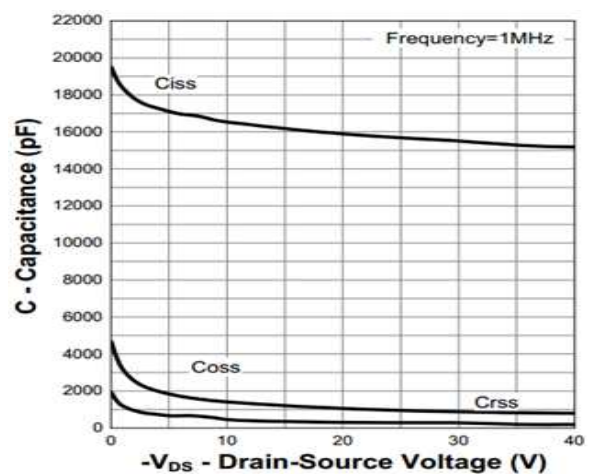
On Resistance Vs Drain Current



On Resistance Vs Gate Source Voltage

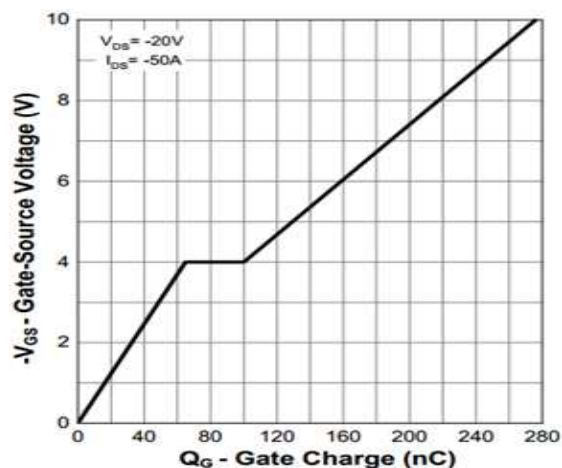


Rdson-JunctionTemperature

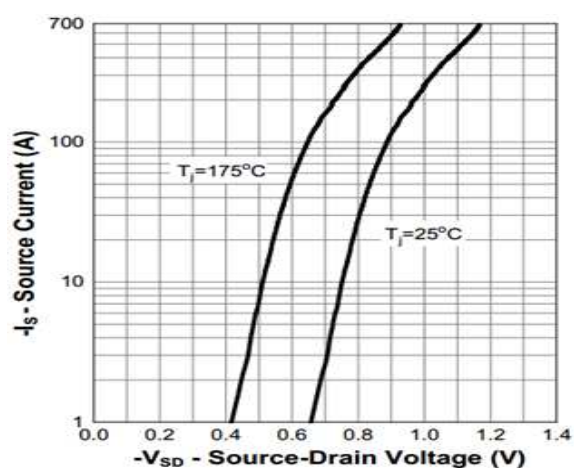


Capacitance

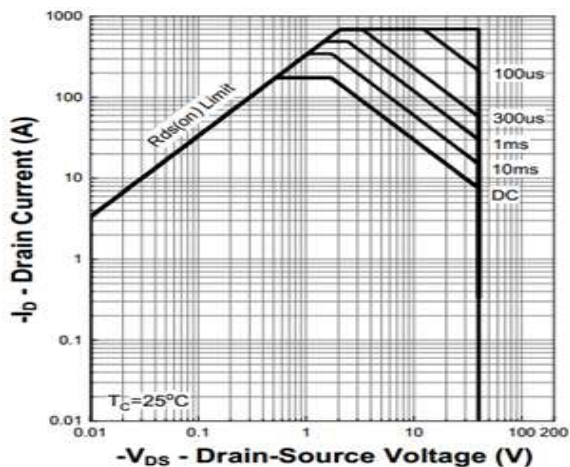




Gate Charge Waveform



Source-Drain Diode Forward Voltage



Maximum Safe Operating Area

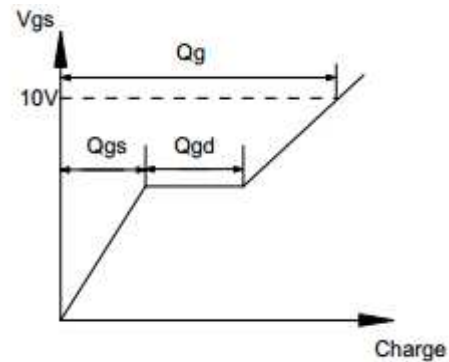
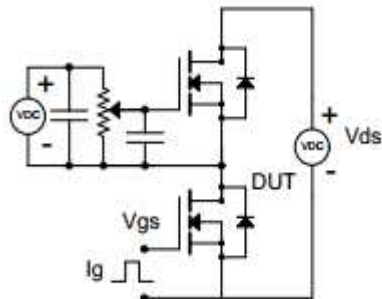
Note : The above characteristics curves are presented for reference only and not guaranteed by production test, unless otherwise noted.



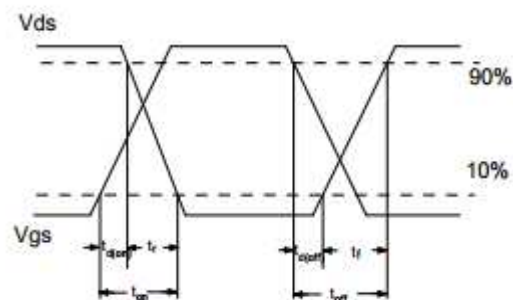
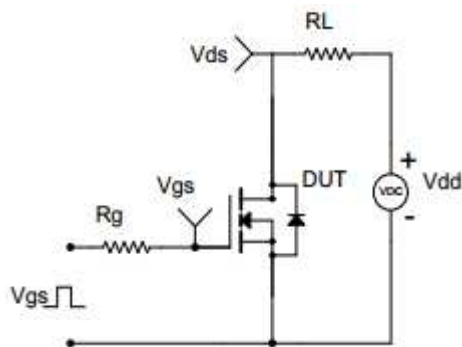


■ Test Circuit & Waveform

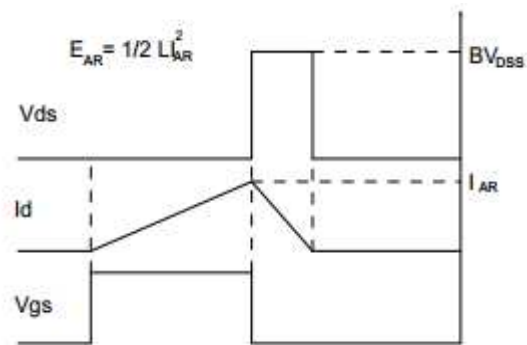
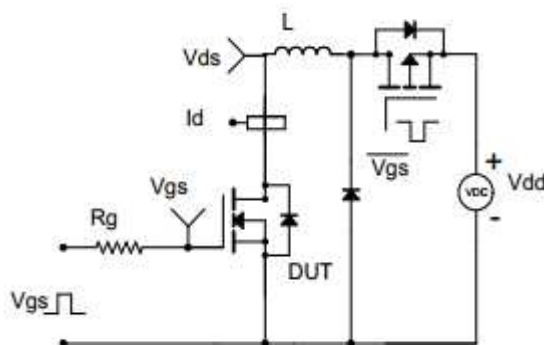
Gate Charge Test Circuit & Waveform



Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveform





■ TO-263 Package Dimensions

Unit: mm

Symbol	Min	Nom	Max	Symbol	Min	Nom	Max
A	4.42		4.72	e1	2.44	2.54	2.64
B	1.22		1.4	e2	4.98		5.18
b	0.76		0.86	L1	14.7	15.1	15.5
b1	1.22		1.4	L2	2	2.3	2.6
b2	0.33		0.43	L3	1.5		2
C	1.22		1.35	K	-0.1		0.1
D	9.95		10.25	Y	8.51	8.61	8.71
E	8.99		9.29				

