

## GL Silicon P-Channel Power MOSFET

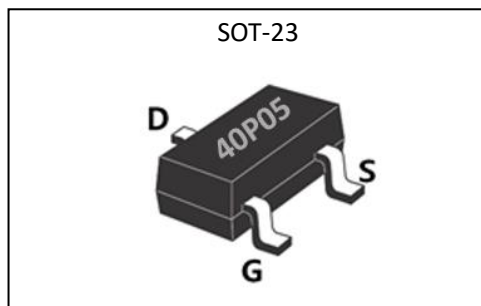
### General Description :

The GL5P04 uses advanced trench technology and design to provide excellent  $R_{DS(ON)}$  with low gate charge. It can be used in a wide variety of applications. The package form is SOT-23-3L, which accords with the RoHS standard.

$V_{DSS}$	-40	V
$I_D$	-5	A
$P_D$	2.0	W
$R_{DS(ON)type}$	75	mΩ

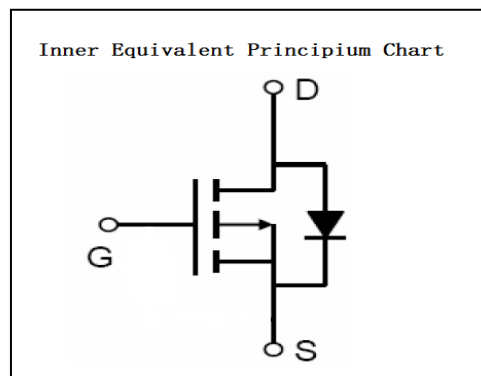
### Features :

- $R_{DS(ON)} < 85m\Omega$  @  $V_{GS}=10V$  (Typ75mΩ)
- High density cell design for ultra low  $R_{dson}$
- Fully characterized avalanche voltage and current
- Excellent package for good heat dissipation



### Applications :

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply



### Absolute ( $T_c = 25^\circ C$ unless otherwise specified ) :

Symbol	Parameter	Rating	Units
$V_{DSS}$	Drain-to-Source Voltage	-40	V
$I_D$	Continuous Drain Current	-5.3	A
$I_{DM}$	Pulsed Drain Current	-3.7	A
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$P_D$	Power Dissipation	2.0	W
$T_J, T_{stg}$	Operating Junction and Storage Temperature Range	150 , -55 to 150	$^\circ C$

**GL Silicon P-Channel Power MOSFET****Electrical Characteristics** (  $T_c = 25^\circ\text{C}$  unless otherwise specified ) :

<b>OFF Characteristics</b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$V_{DSS}$	Drain to Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	-40	--	--	V
$I_{DSS}$	Drain to Source Leakage Current	$V_{DS}=-40V, V_{GS}=0V, T_a=25^\circ\text{C}$	--	--	-1.0	$\mu A$
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=+20V$	--	--	0.1	$\mu A$
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=-20V$	--	--	-0.1	$\mu A$

<b>ON Characteristics<sup>a3</sup></b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$R_{DS(ON)}$	Drain-to-Source On-Resistance	$V_{GS}=-10V, I_D=-5A$	--	75	85	m $\Omega$
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	-1.0	--	-3.0	V
Pulse width $t_p \leq 380\mu s, \delta \leq 2\%$						

<b>Dynamic Characteristics<sup>a4</sup></b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$g_{fs}$	Forward Transconductance	$V_{DS}=-15V, I_D=-4A$	8	--	--	S
$C_{iss}$	Input Capacitance	$V_{GS}=0V, V_{DS}=-20V$ $f=1.0\text{MHz}$	--	600	--	pF
$C_{oss}$	Output Capacitance		--	90	--	
$C_{rss}$	Reverse Transfer Capacitance		--	70	--	

<b>Resistive Switching Characteristics<sup>a4</sup></b>						
Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$t_{d(ON)}$	Turn-on Delay Time	$V_{DD}=-20V, R_L=2\Omega$ $V_{GS}=-10V, R_G=3\Omega$	--	9	--	ns
$t_r$	Rise Time		--	8	--	
$t_{d(OFF)}$	Turn-Off Delay Time		--	28	--	
$t_f$	Fall Time		--	10	--	
$Q_g$	Total Gate Charge	$V_{DD}=-20V, I_D=-4A$ $V_{GS}=-10V$	--	14	--	nC
$Q_{gs}$	Gate to Source Charge		--	2.9	--	
$Q_{gd}$	Gate to Drain ( "Miller" ) Charge		--	3.8	--	

## GL Silicon P-Channel Power MOSFET

### Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Rating			Units
			Min.	Typ.	Max.	
$I_S$	Continuous Source Current <sup>a2</sup> (Body Diode)		--	--	-5.3	A
$V_{SD}$	Diode Forward Voltage <sup>a3</sup>	$I_S = -5.3A, V_{GS} = 0V$	--	--	-1.2	V

Symbol	Parameter	Typ.	Units
$R_{\theta JC}$	Junction-to-Case <sup>a2</sup>	83.3	°C/W

<sup>a1</sup> : Repetitive Rating: Pulse width limited by maximum junction temperature.

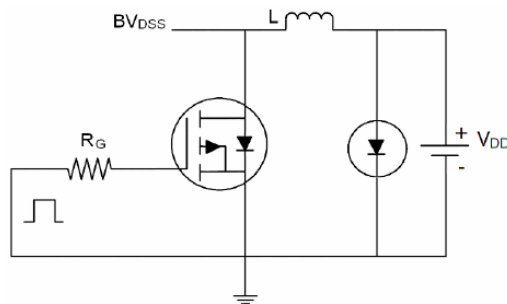
<sup>a2</sup> : Surface Mounted on FR4 Board,  $t \leq 10\text{sec}$ .

<sup>a3</sup> : Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

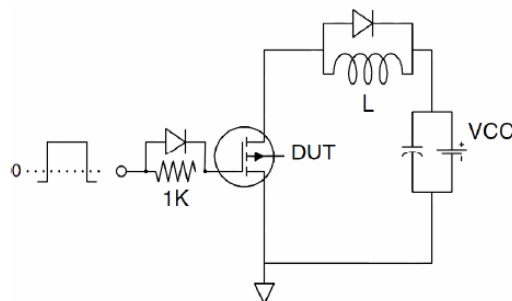
<sup>a4</sup> : Guaranteed by design, not subject to production

### Test circuit

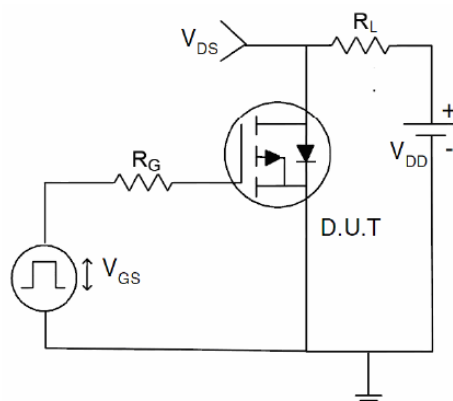
#### 1) $E_{AS}$ Test Circuit



#### 2) Gate Charge Test Circuit



#### 3) Switch Time Test Circuit



## GL Silicon P-Channel Power MOSFET

### Typical Electrical and Thermal Characteristics

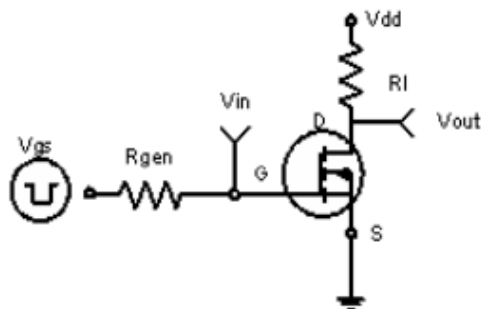


Figure 1: Switching Test Circuit

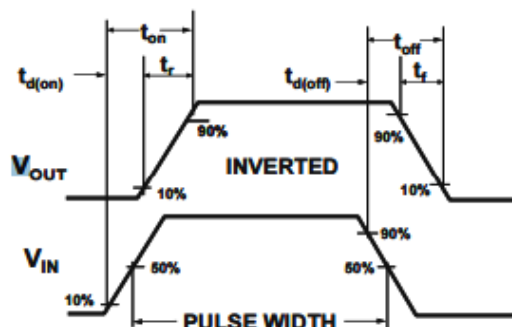


Figure 2: Switching Waveforms

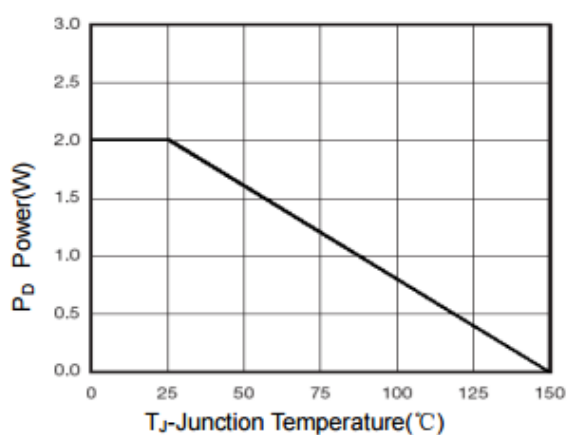


Figure 3 Power Dissipation

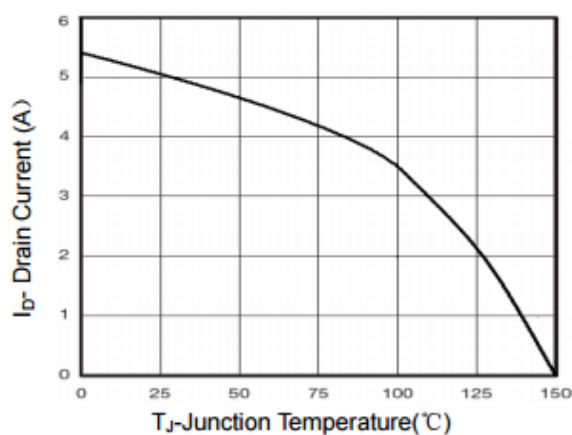


Figure 4 Drain Current

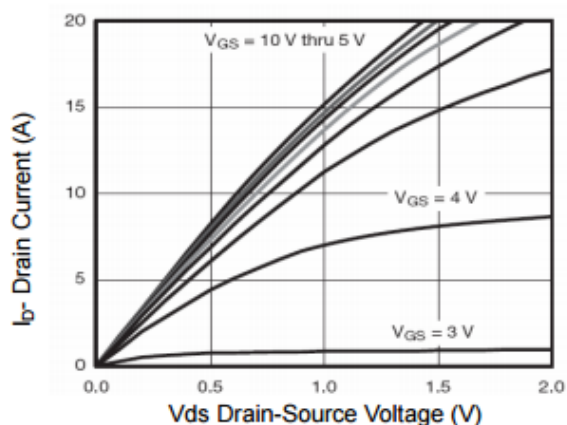


Figure 5 Output Characteristics

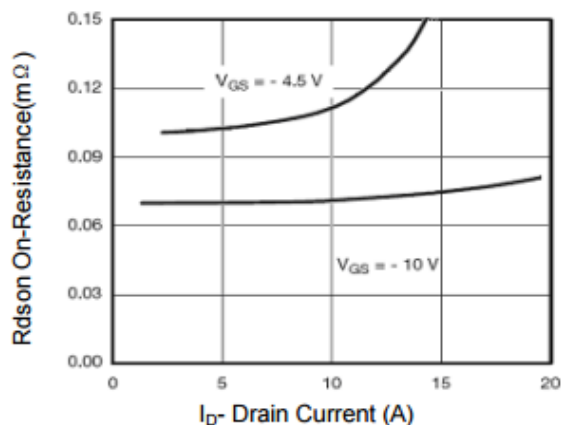
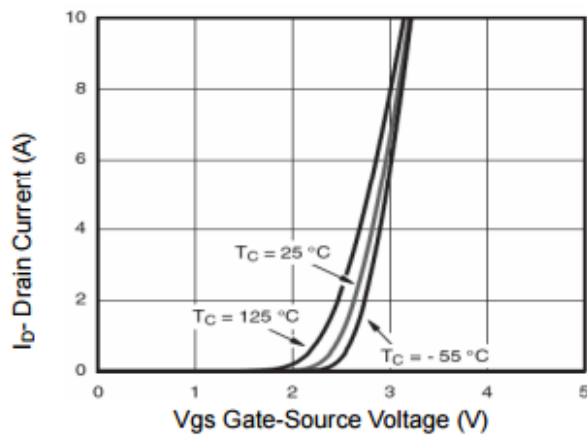
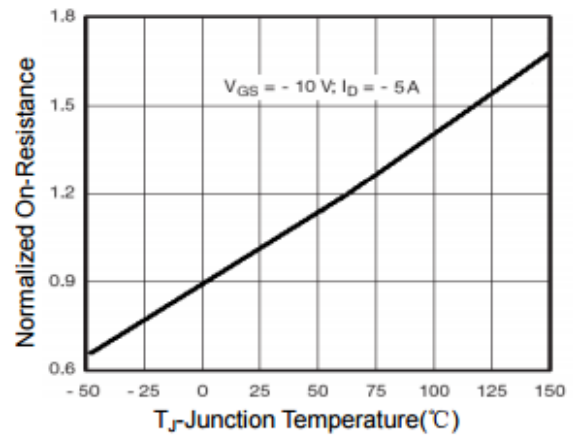


Figure 6 Drain-Source On-Resistance

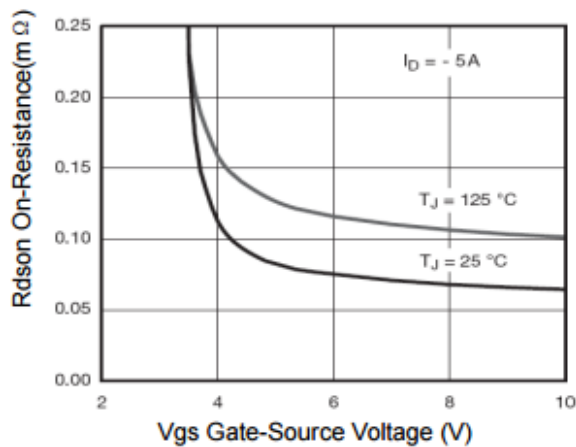
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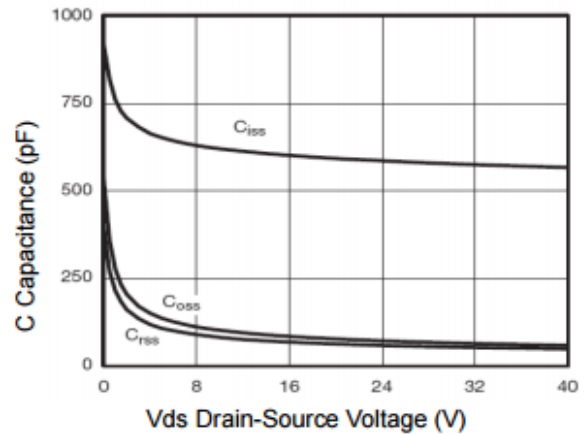
**Figure 7 Transfer Characteristics**



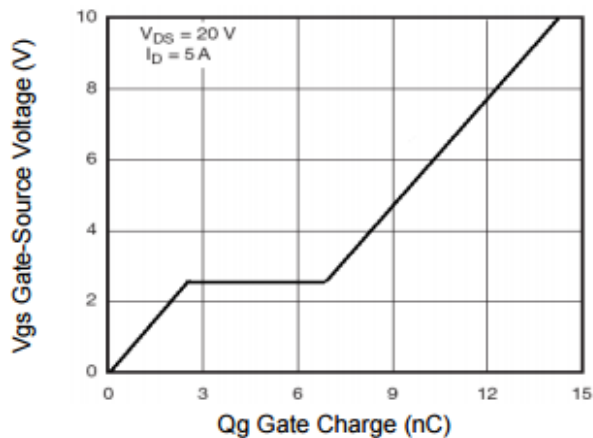
**Figure 8 Drain-Source On-Resistance**



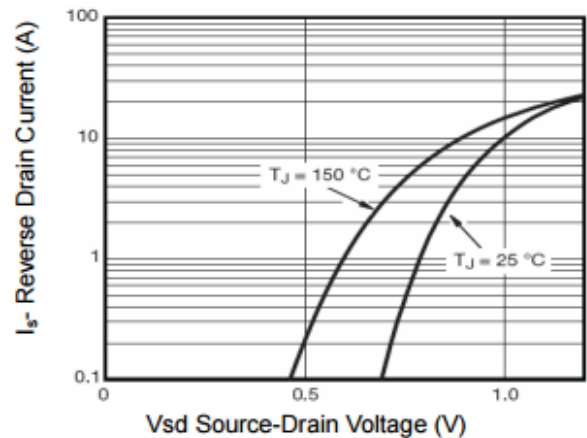
**Figure 9 Rdson vs Vgs**



**Figure 10 Capacitance vs Vds**

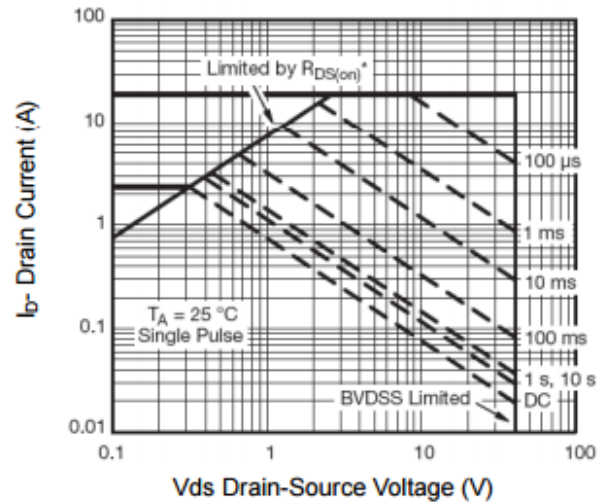


**Figure 11 Gate Charge**

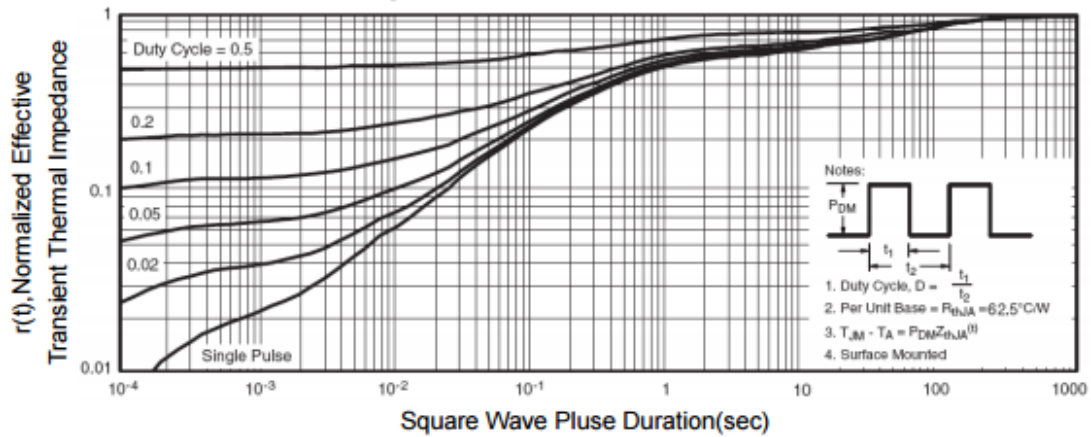


**Figure 12 Source-Drain Diode Forward**

## GL Silicon P-Channel Power MOSFET



**Figure 13 Safe Operation Area**



**Figure 14 Normalized Maximum Transient Thermal Impedance**

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