

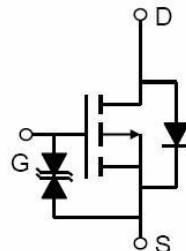
## P-Channel Enhancement Mode Power MOSFET

### Description

The G04P10HE uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge. It can be used in a wide variety of applications.

### General Features

- $V_{DS}$  -100V
- $I_D$  (at  $V_{GS} = -10V$ ) -4A
- $R_{DS(ON)}$  (at  $V_{GS} = -10V$ ) < 200mΩ
- $R_{DS(ON)}$  (at  $V_{GS} = -4.5V$ ) < 250mΩ
- 100% Avalanche Tested
- RoHS Compliant
- ESD (HBM)>6KV



Schematic diagram



SOT-223

### Application

- Power switch
- DC/DC converters

### Ordering Information

Device	Package	Marking	Packaging
G04P10HE	SOT-223	G04P10	2500pcs/Reel

### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ , unless otherwise noted

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	-100	V
Continuous Drain Current	$I_D$	-4	A
Pulsed Drain Current (note1)	$I_{DM}$	-16	A
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Power Dissipation	$P_D$	1.2	W
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 To 150	°C

### Thermal Resistance

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-Ambient	$R_{thJA}$	100	°C/W

**Specifications**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

Parameter	Symbol	Test Conditions	Value			Unit
			Min.	Typ.	Max.	
<b>Static Parameters</b>						
Drain-Source Breakdown Voltage	$V_{(\text{BR})\text{DSS}}$	$V_{\text{GS}} = 0\text{V}, I_D = -250\mu\text{A}$	-100	--	--	V
Zero Gate Voltage Drain Current	$I_{\text{DSS}}$	$V_{\text{DS}} = -100\text{V}, V_{\text{GS}} = 0\text{V}$	--	--	-1	$\mu\text{A}$
Gate-Source Leakage	$I_{\text{GSS}}$	$V_{\text{GS}} = \pm 20\text{V}$	--	--	$\pm 10$	$\mu\text{A}$
Gate-Source Threshold Voltage	$V_{\text{GS}(\text{th})}$	$V_{\text{DS}} = V_{\text{GS}}, I_D = -250\mu\text{A}$	-1.2	-1.55	-2.8	V
Drain-Source On-Resistance	$R_{\text{DS}(\text{on})}$	$V_{\text{GS}} = -10\text{V}, I_D = -6\text{A}$	--	177	200	$\text{m}\Omega$
		$V_{\text{GS}} = -4.5\text{V}, I_D = -6\text{A}$	--	190	250	
Forward Transconductance	$g_{\text{FS}}$	$V_{\text{DS}} = -5\text{V}, I_D = -3\text{A}$	--	10	--	S
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{\text{iss}}$	$V_{\text{GS}} = 0\text{V}, V_{\text{DS}} = -50\text{V}, f = 1.0\text{MHz}$	--	1647	--	$\text{pF}$
Output Capacitance	$C_{\text{oss}}$		--	43	--	
Reverse Transfer Capacitance	$C_{\text{rss}}$		--	42	--	
Total Gate Charge	$Q_g$	$V_{\text{DD}} = -50\text{V}, I_D = -4\text{A}, V_{\text{GS}} = -10\text{V}$	--	25	--	$\text{nC}$
Gate-Source Charge	$Q_{\text{gs}}$		--	5	--	
Gate-Drain Charge	$Q_{\text{gd}}$		--	7	--	
Turn-on Delay Time	$t_{\text{d}(\text{on})}$	$V_{\text{DD}} = -50\text{V}, I_D = -4\text{A}, R_G = 9\Omega$	--	14	--	$\text{ns}$
Turn-on Rise Time	$t_r$		--	18	--	
Turn-off Delay Time	$t_{\text{d}(\text{off})}$		--	50	--	
Turn-off Fall Time	$t_f$		--	18	--	
<b>Drain-Source Body Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$	$T_C = 25^\circ\text{C}$	--	--	-4	A
Body Diode Voltage	$V_{\text{SD}}$	$T_J = 25^\circ\text{C}, I_{\text{SD}} = -6\text{A}, V_{\text{GS}} = 0\text{V}$	--	--	-1.2	V
Reverse Recovery Charge	$Q_{\text{rr}}$	$I_F = -4\text{A}, V_{\text{GS}} = 0\text{V}$ $dI/dt = -100\text{A}/\mu\text{s}$	--	46	--	$\text{nC}$
Reverse Recovery Time	$T_{\text{rr}}$		--	35	--	ns

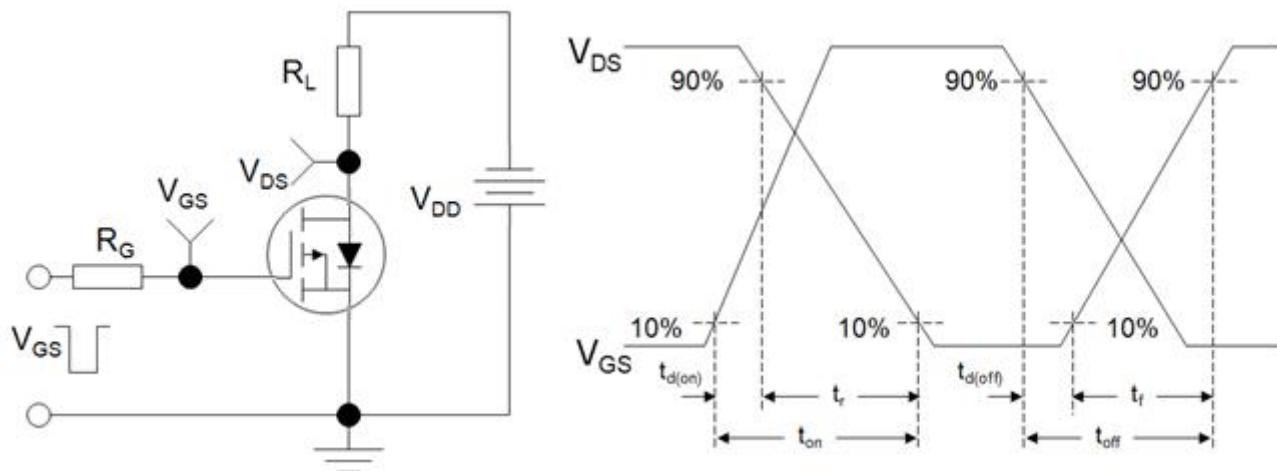
**Notes**

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. Identical low side and high side switch with identical  $R_G$

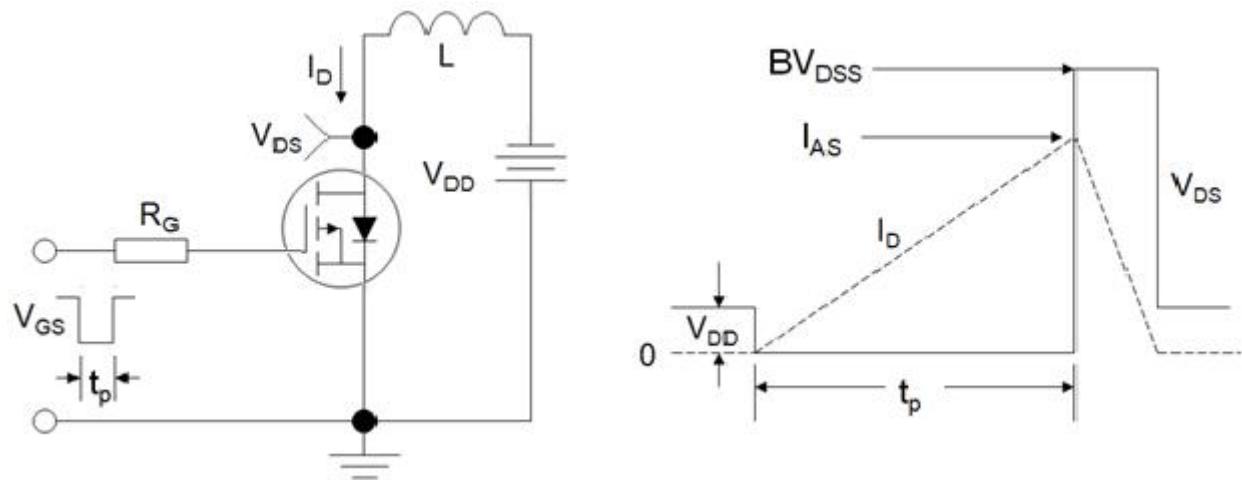
Gate Charge Test Circuit



Switch Time Test Circuit

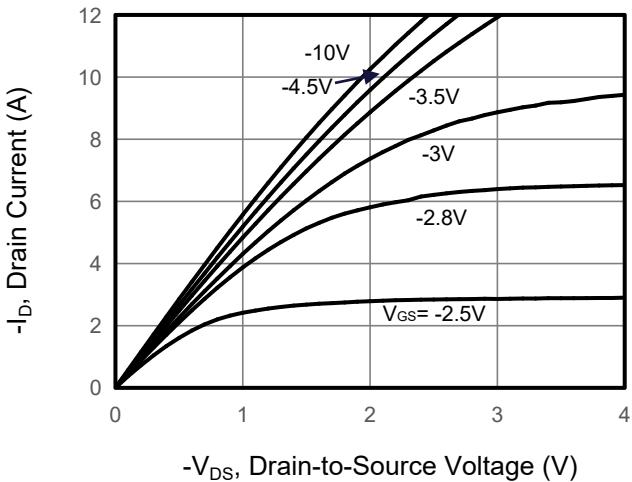


EAS Test Circuit

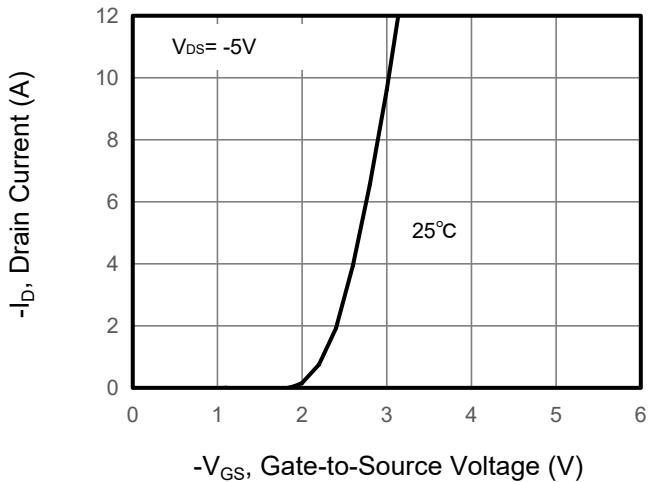


**Typical Characteristics**  $T_J = 25^\circ\text{C}$ , unless otherwise noted

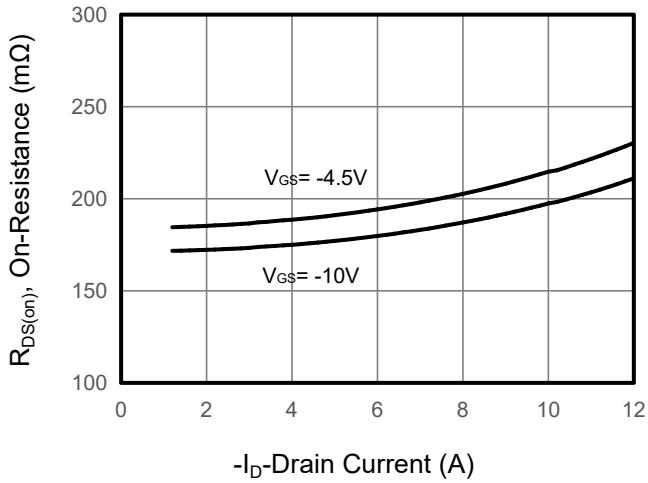
**Figure 1. Output Characteristics**



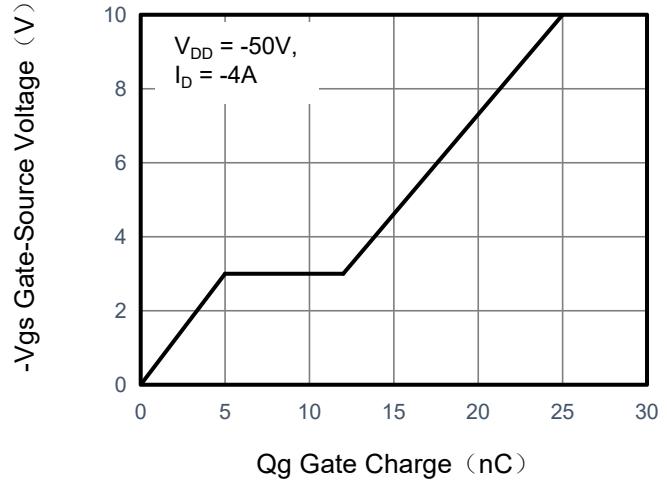
**Figure 2. Transfer Characteristics**



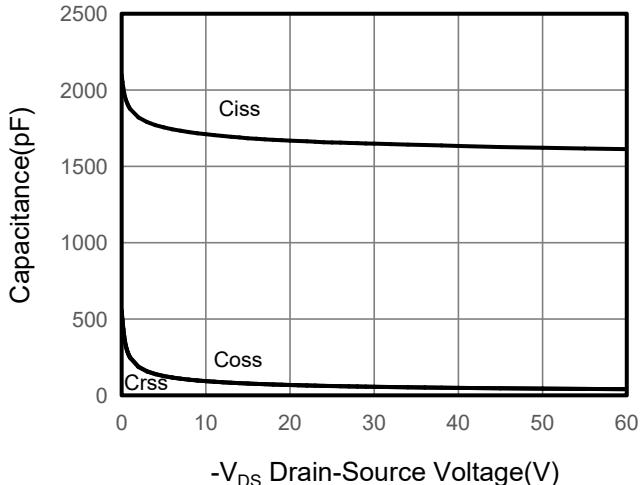
**Figure 3. Drain Source On Resistance**



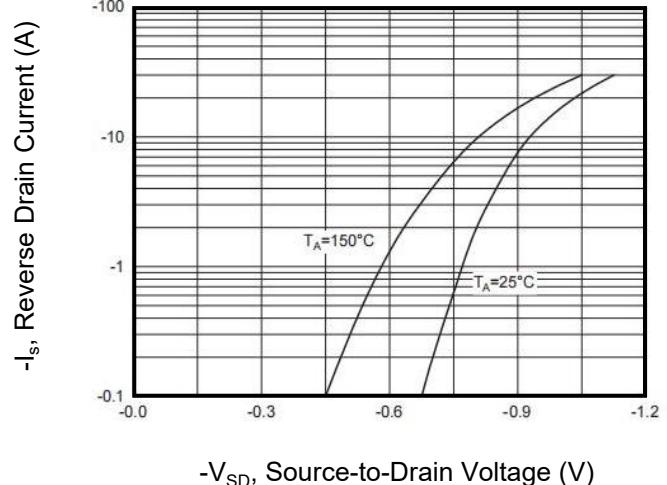
**Figure 4. Gate Charge**



**Figure 5. Capacitance**

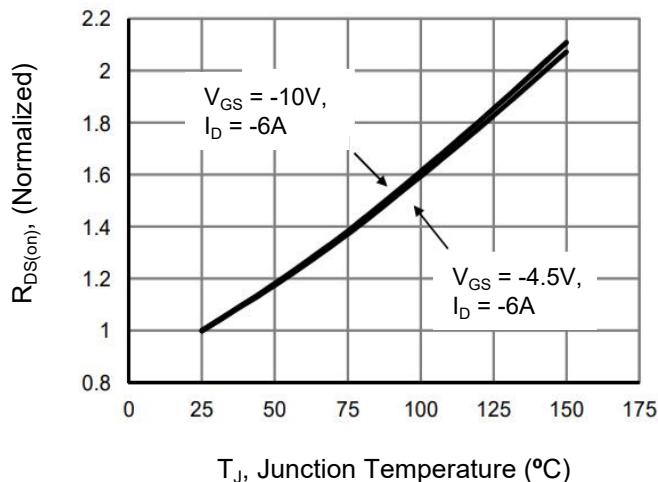


**Figure 6. Source-Drain Diode Forward**

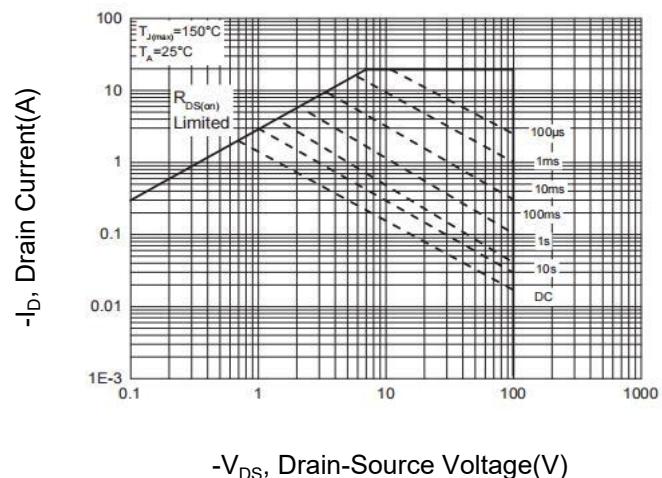


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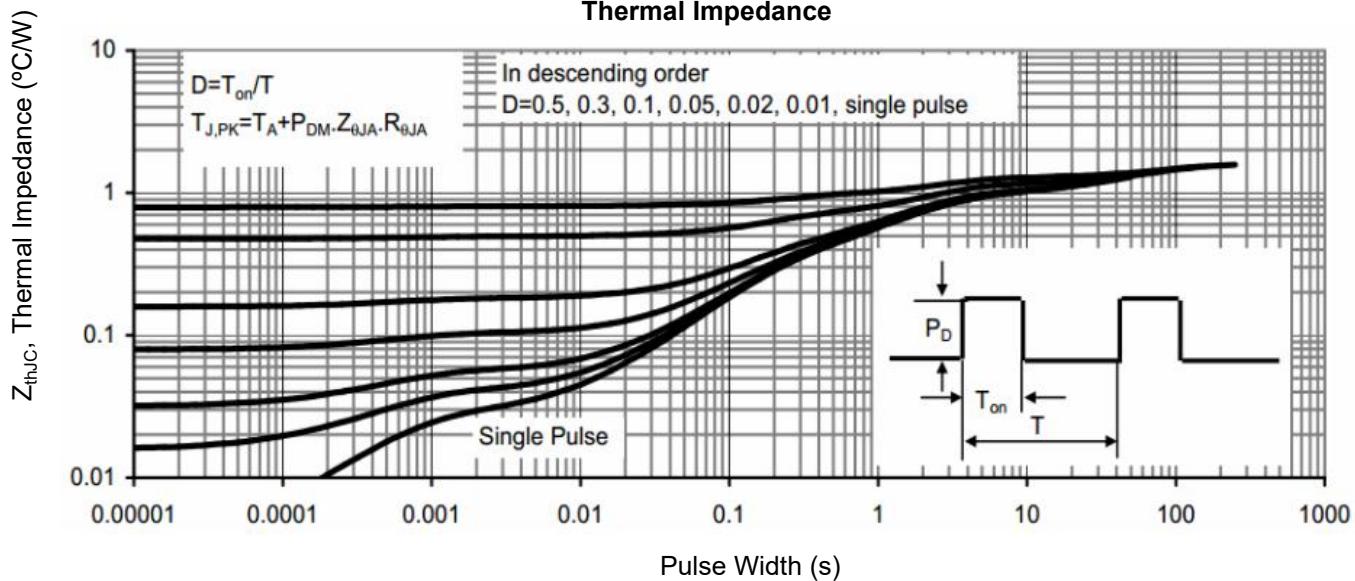
**Figure 7. Drain-Source On-Resistance**

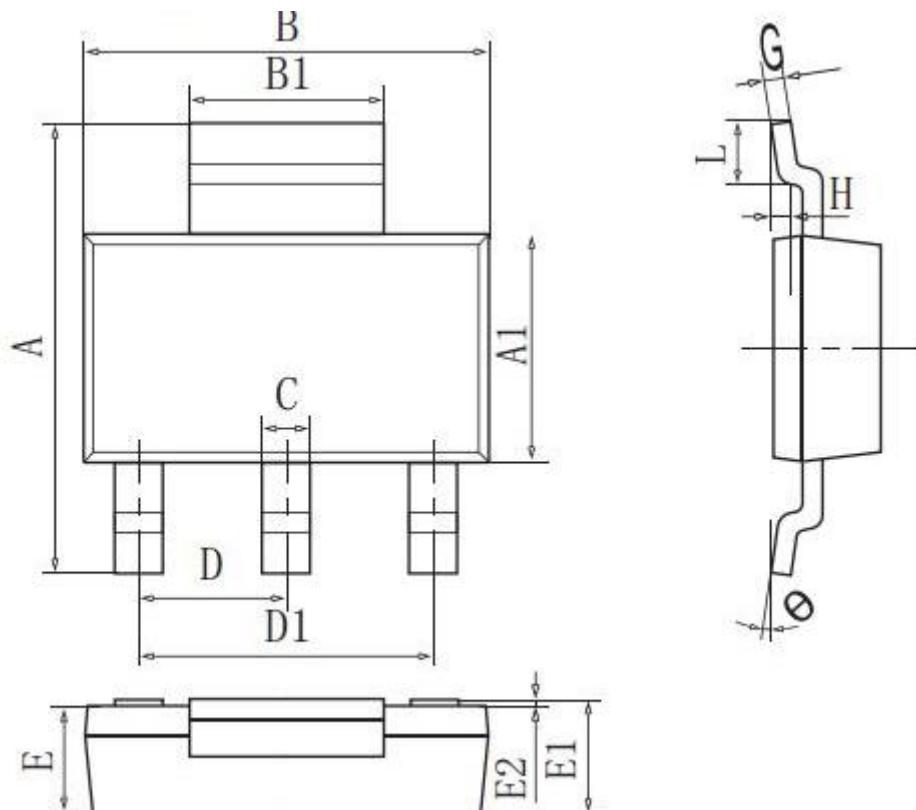


**Figure 10. Safe Operation Area**



**Figure 9. Normalized Maximum Transient Thermal Impedance**



**SOT-223 Package Mechanical Data**

DIM	MIN	NOM	MAX
A	6.80	7.00	7.20
A1	3.30	3.50	3.70
B	6.40	6.60	6.80
B1	2.96	3.00	3.10
C	0.66	0.70	0.80
D	2.25	2.30	2.35
D1	4.60REF		
E	1.50	1.60	1.70
E1	1.65REF		
E2	0.02	0.06	0.10
G	0.255	0.305	0.355
H	0.25GAUGR		
L	0.90	-	-
θ	0°	-	10°
All Dimensions in mm			