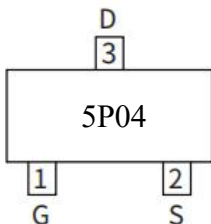




Features ➤ Super Low Gate Charge ➤ Green Device Available ➤ Excellent CdV/dt effect decline ➤ Advanced high cell density Trench technology	Bvdss	Rdson	ID
	-40V	45mΩ	-5A
	Application ➤ Battery protection ➤ Load Switch ➤ Uninterruptible power supply		



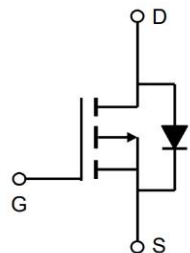
Package



Marking and pin assignment



SOT23-3L top view



Schematic diagram

Package Marking and Ordering Information

Device Marking	Device	Device Package	Quantity
5P04	HL5P04L	SOT23-3L	3000

Absolute Maximum Ratings (T_A=25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V _{DS}	-40	V
Gate-Source Voltage	V _{GS}	±20	V
Continuous Drain Current, V _{GS} @-10V ¹	I _D @T _A =25°C	-5	A
	I _D @T _A =70°C	-3.6	A
Pulsed Drain Current ²	I _{DM}	-22	A
Single Pulsed Avalanche Energy	E _{AS}	-	mJ
Total Power Dissipation	P _D	2	W
Storage Temperature Range	T _{STG}	-55 ~ 150	°C
Operating Junction Temperature Range	T _J	-55 ~ 150	°C

Thermal Resistance Ratings

Parameter	Symbol	Value	Unit
Thermal Resistance Junction-Ambient ¹	R _{θJA}	65	°C/W
Thermal Resistance Junction-Case ¹	R _{θJC}	-	°C/W



Ordering Information

Ordering Number	Package	Pin Assignment			Packing
Halogen Free		G	S	D	
HL5P04L	SOT23-3L	1	2	3	Tape Reel

Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-40	-	-	V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=-40V, V_{GS}=0V$	-	-	-1	μA
Gate-Source Leakage Current	I_{GSS}	$V_{DS}=0V, V_{GS}=\pm 20V$	-	-	± 100	nA
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.6	-2.5	V
Static Drain-Source On-Resistance ²	$R_{DS(on)}$	$V_{GS}=-10V, I_D=-5A$	-	45	54	m Ω
		$V_{GS}=-4.5V, I_D=-4A$	-	60	85	
Input Capacitance	C_{iss}	$V_{DS}=-20V, V_{GS}=0V,$ $f=1\text{MHz}$	-	869	-	pF
Output Capacitance	C_{oss}		-	94	-	
Reverse Transfer Capacitance	C_{rss}		-	69	-	
Total Gate Charge	Q_g	$V_{DS}=-20V, V_{GS}=-10V, I_D=-4A$	-	17.3	-	nC
Gate-Source Charge	Q_{gs}		-	3.2	-	
Gate-Drain Charge	Q_{gd}		-	4.3	-	
Turn-on Delay Time	$t_{d(on)}$	$V_{GS}=-10V, V_{DD}=-20V,$ $R_G=3\Omega, I_D=-4A$	-	10.3	-	ns
Rise Time	t_r		-	4.3	-	
Turn-off Delay Time	$t_{d(off)}$		-	39	-	
Fall Time	t_f		-	46.5	-	
Continuous Source Current	I_S	$V_G=V_D=0V$, Force Current	-	-	-5	A
Pulsed Source Current	I_{SM}		-	-	-22	A
Drain to Source Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=-5.5A$	-	-0.8	-1.2	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V, I_S=-5.5A,$ $di/dt=100A/\mu s$	-	17	-	nS
Reverse Recovery Charge	Q_{rr}		-	11.5	-	nC

Notes:

1. Repetitive Rating: Pulse Width Limited by Maximum Junction Temperature
2. Pulse Test: Pulse Width $\leq 300 \mu s$, Duty Cycle $\leq 2\%$



Typical Performance Characteristics

Figure 1: Output Characteristics

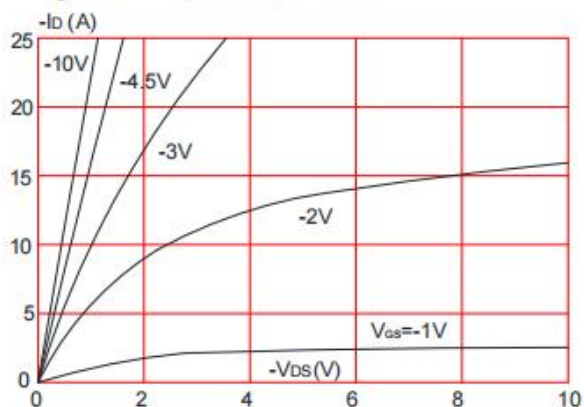


Figure 2: Typical Transfer Characteristics

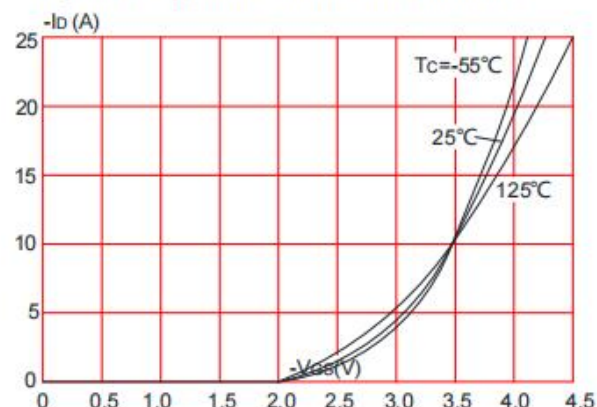


Figure 3: On-resistance vs. Drain Current

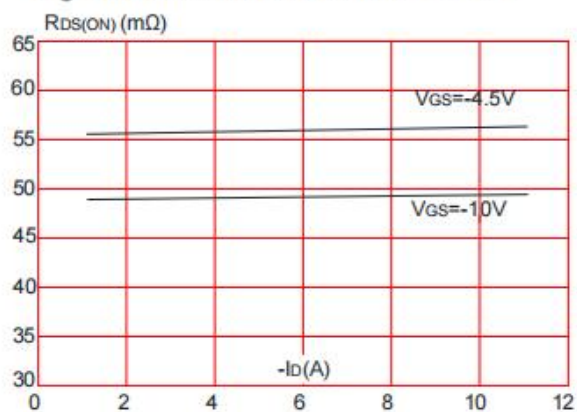


Figure 4: Body Diode Characteristics

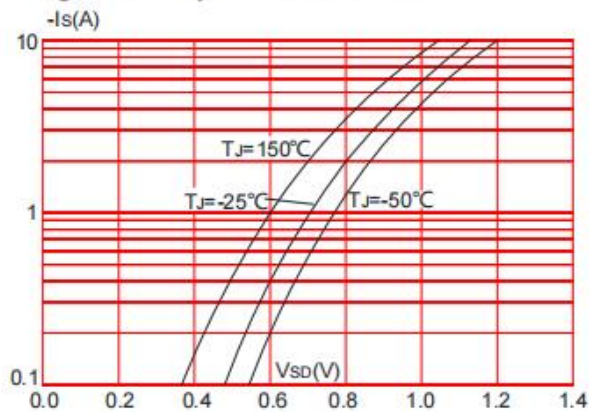


Figure 5: Gate Charge Characteristics

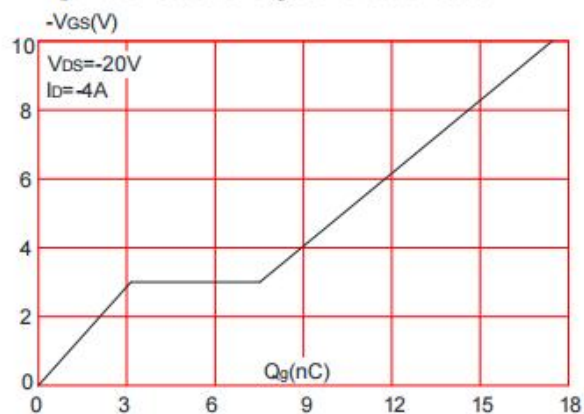


Figure 6: Capacitance Characteristics

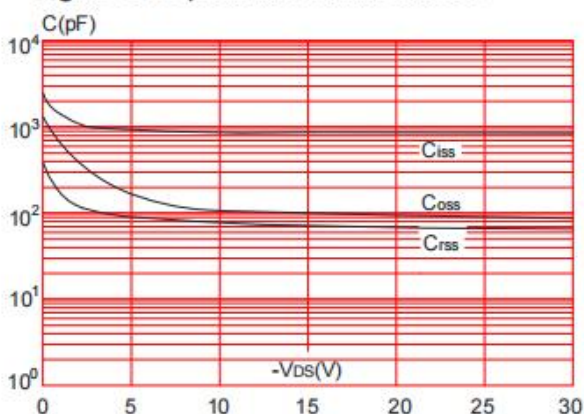
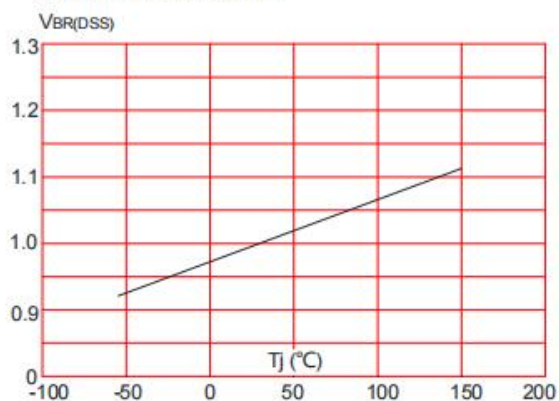
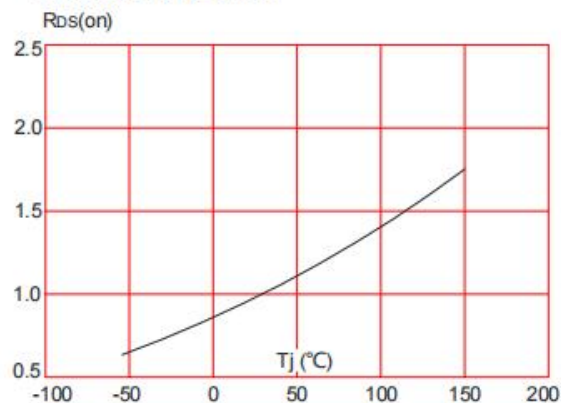
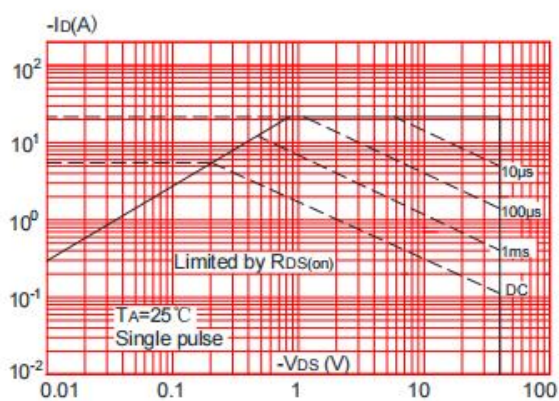
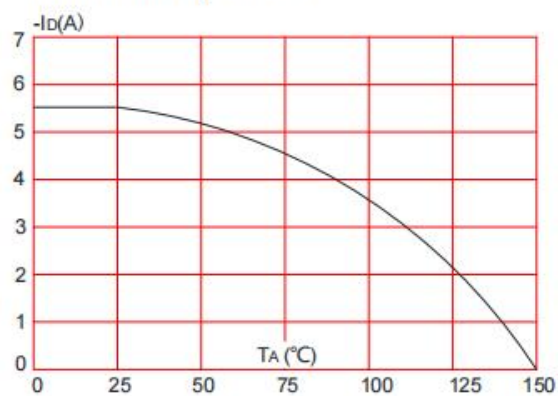
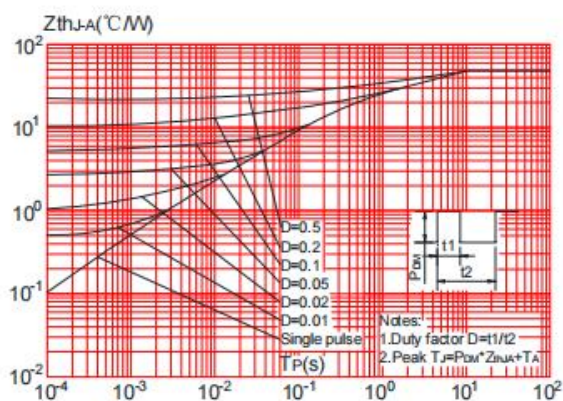
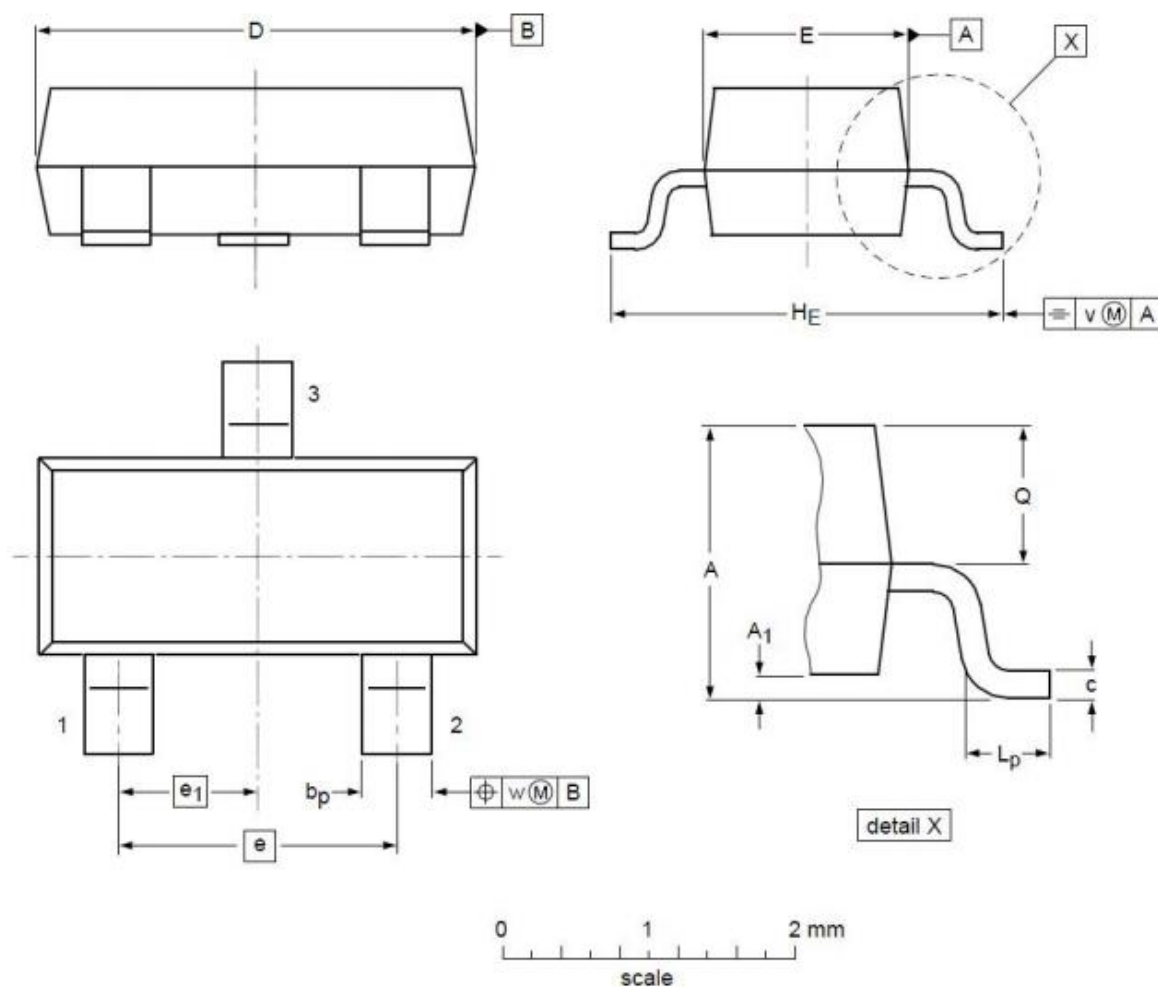


**Figure 7:** Normalized Breakdown Voltage vs. Junction Temperature**Figure 8:** Normalized on Resistance vs. Junction Temperature**Figure 9:** Maximum Safe Operating Area**Figure 10:** Maximum Continuous Drain Current vs. Ambient Temperature**Figure 11:** Maximum Effective Transient Thermal Impedance, Junction-to-Ambient



Package Dimensions SOT23-3L



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°



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