

650V / 4A
N-Channel Enhancement Mode MOSFET

650V, $R_{DS(ON)}=2.8\Omega@V_{GS}=10V, I_D=2A$

Features

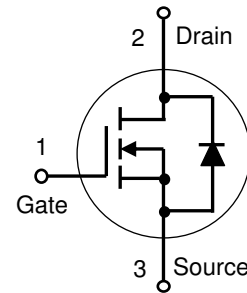
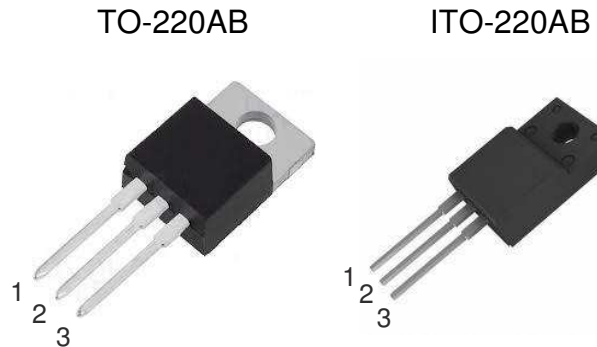
- Low On-State Resistance
- Fast Switching
- Low Gate Charge & Low C_{RSS}
- Fully Characterized Avalanche Voltage and Current
- Specially Designed for AC Adapter, Battery Charger and SMPS
- In compliance with EU RoHs 2002/95/EC Directives

Mechanical Information

- Case: TO-220AB / ITO-220AB Molded Plastic
- Terminals : Solderable per MIL-STD-750, Method 2026

Marking & Ordering Information

TYPE	MARKING	PACKAGE	PACKING
HY4N65T	4N65T	TO-220AB	50PCS/TUBE
HY4N65FT	4N65FT	ITO-220AB	50PCS/TUBE



Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	HY4N65T	HY4N65FT	Units
Drain-Source Voltage	V_{DS}	650		V
Gate-Source Voltage	V_{GS}	± 30		V
Continuous Drain Current	I_D	4	4	A
Pulsed Drain Current ¹⁾	I_{DM}	16	16	A
Maximum Power Dissipation	P_D	71	26	W
Derating Factor		0.57	0.21	
Avalanche Energy with Single Pulse	E_{AS}	180		mJ
$I_{AS}=4A, V_{DD}=150V, L=22.5mH$				
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150		$^\circ\text{C}$

Note : 1. Maximum DC current limited by the package

Thermal Characteristics

Parameter	Symbol	HY4N65T	HY4N65FT	Units
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	1.76	4.8	$^\circ\text{C/W}$
Junction-to-Air Thermal Resistance	$R_{\theta JA}$	50	110	$^\circ\text{C/W}$

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Electrical Characteristics ($T_c=25^\circ\text{C}$, Unless otherwise noted)

Paramter	Symbol	Test Condition	Min.	Typ.	Max.	Units
Static						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V \cdot I_D=250\mu A$	650	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS} \cdot I_D=250\mu A$	2.0	-	4.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V \cdot I_D=2A$	-	2.5	2.8	Ω
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=650V \cdot V_{GS}=0V$	-	-	10	μA
Gate Body Leakage Current	I_{GSS}	$V_{GS}=\pm 30V \cdot V_{DS}=0V$	-	-	± 100	nA
Dynamic						
Total Gate Charge	Q_g	$V_{DS}=520V \cdot I_D=4A$ $V_{GS}=10V$	-	16.2	20	nC
Gate-Source Charge	Q_{gs}		-	3.2	-	
Gate-Drain Charge	Q_{gd}		-	5.6	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=325V \cdot I_D=4A$ $V_{GS}=10V \cdot R_G=25\Omega$	-	16.8	22	ns
Turn-On Rise Time	t_r		-	36	46	
Turn-Off Delay Time	$t_{d(off)}$		-	21.8	32	
Turn-Off Fall Time	t_f		-	19.2	28	
Input Capacitance	C_{iss}	$V_{DS}=25V \cdot V_{GS}=0V$ $f=1.0M_{HZ}$	-	480	-	pF
Output Capacitance	C_{oss}		-	65	-	
Reverse Transfer Capacitance	C_{riss}		-	1.3	-	
Source-Drain Diode						
Max. Diode Forwad Voltage	I_S	-	-	-	4.0	A
Max. Pulsed Source Current	I_{SM}	-	-	-	16.0	A
Diode Forward Voltage	V_{SD}	$I_S=4A \cdot V_{GS}=0V$	-	-	1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V \cdot I_S=4A$ $di/dt=100A/\mu s$	-	210	-	ns
Reverse Recovery Charge	Q_{rr}		-	0.8	-	μC

NOTE : Pulse Test : Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$

Typical Characteristics Curves ($T_C=25^\circ\text{C}$, unless otherwise noted)

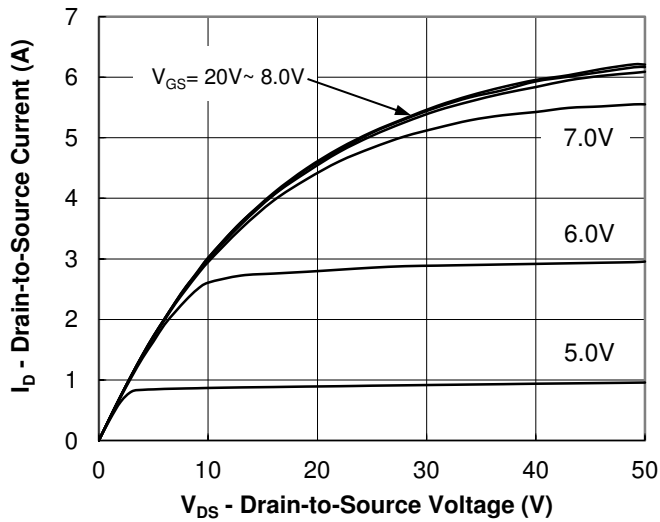


Fig.1 Output Characteristic

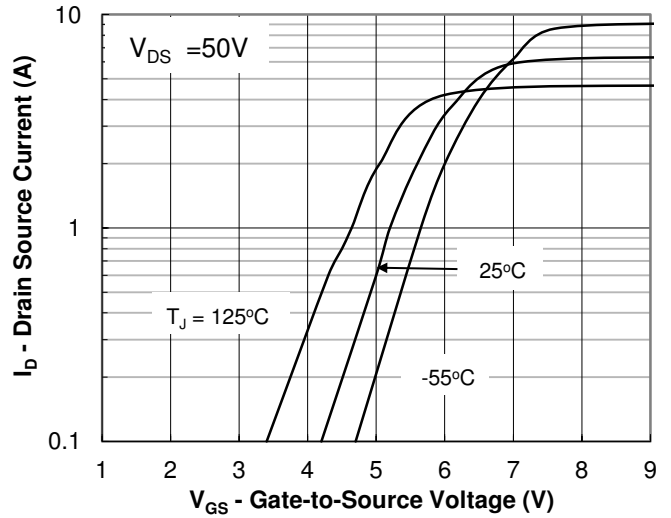


Fig.2 Transfer Characteristic

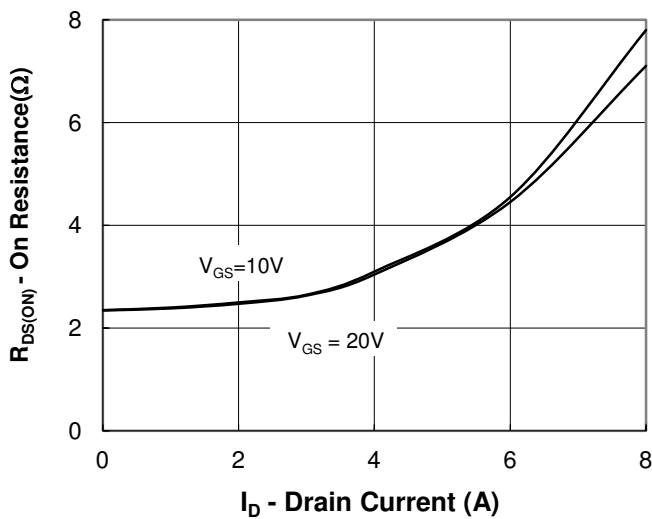


Fig.3 On-Resistance vs Drain Current

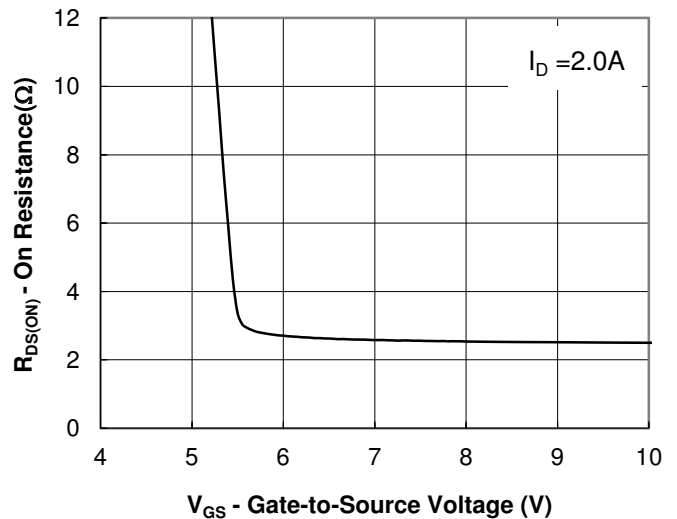


Fig.4 On-Resistance vs Gate to Source Voltage

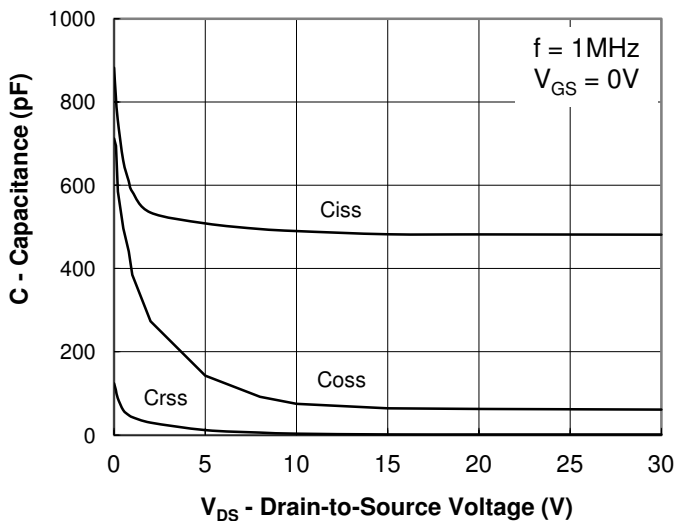


Fig.5 Capacitance Characteristic

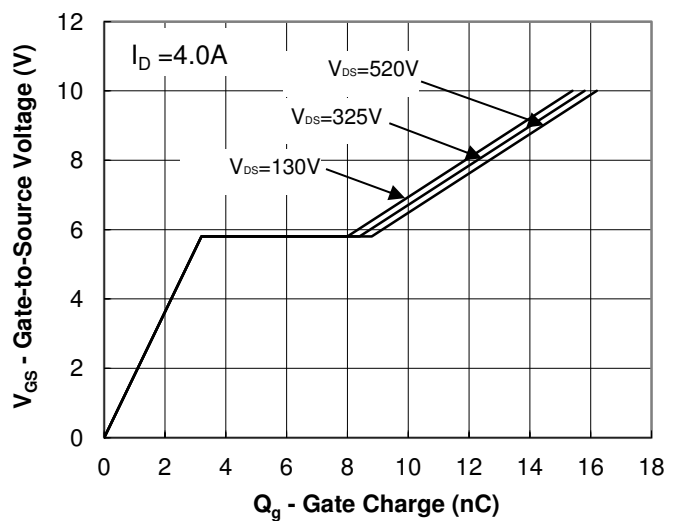


Fig.6 Gate Charge Characteristic

Typical Characteristics Curves ($T_C=25^\circ\text{C}$, unless otherwise noted)

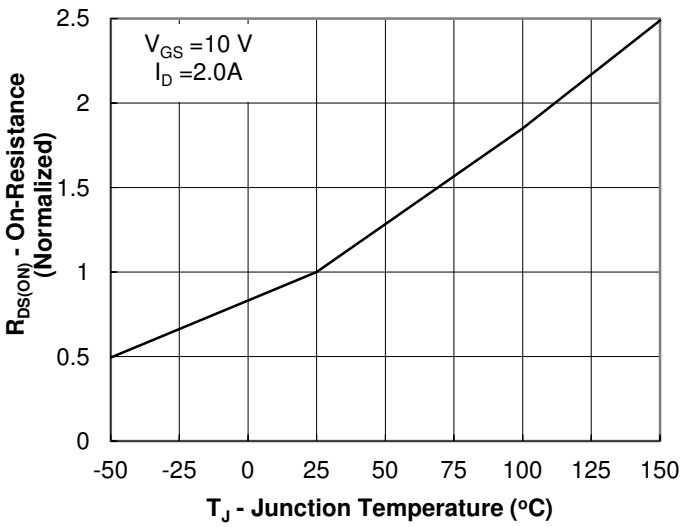


Fig.7 On-Resistance vs Junction Temperature

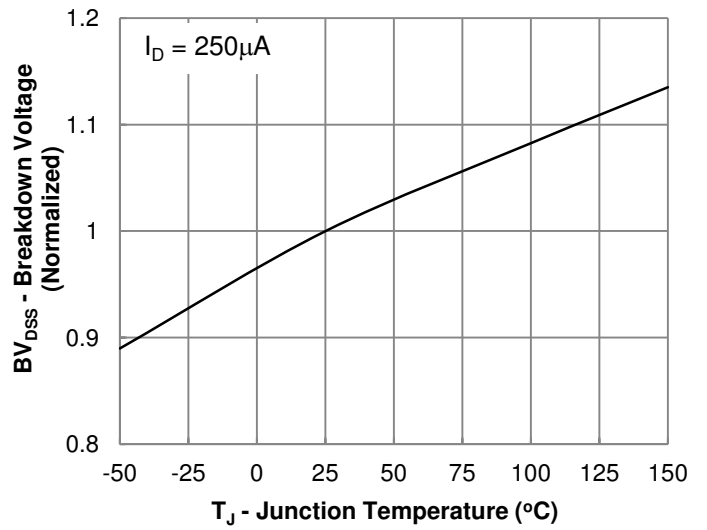


Fig.8 Breakdown Voltage vs Junction Temperature

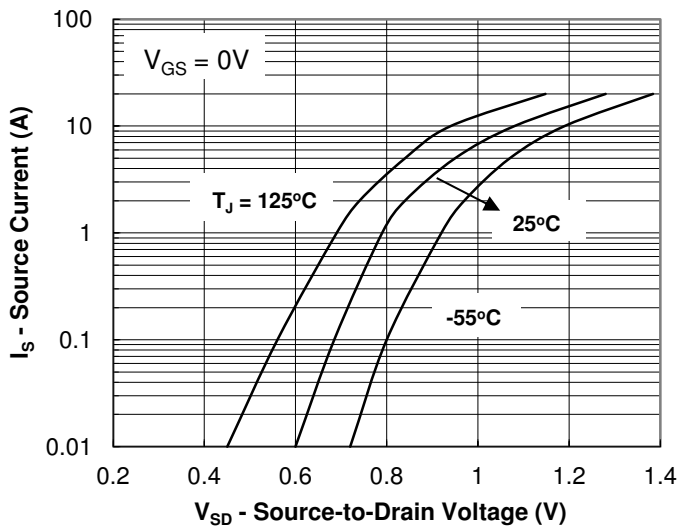


Fig.9 Body Diode Forward Voltage Characteristic