

500V / 13A
N-Channel Enhancement Mode MOSFET

500V, $R_{DS(ON)}=0.52\Omega @ V_{GS}=10V, I_D=6.5A$

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

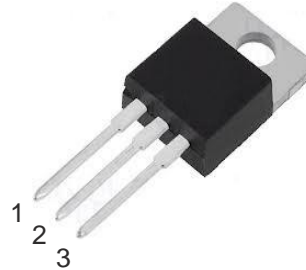
Mechanical Information

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

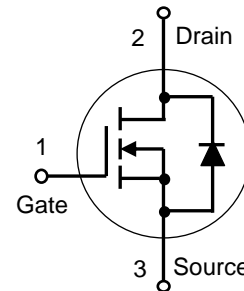
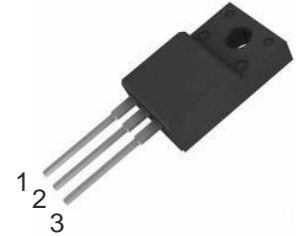
Marking & Ordering Information

TYPE	MARKING	PACKAGE	PACKING
HY13N50T	13N50T	TO-220AB	50PCS/TUBE
HY13N50FT	13N50FT	ITO-220AB	50PCS/TUBE

TO-220AB



ITO-220AB



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

Parameter	Symbol	HY13N50T	HY13N50FT	Units
Drain-Source Voltage	V_{DS}	500		V
Gate-Source Voltage	V_{GS}	± 30		V
Continuous Drain Current	I_D	13	13	A
Pulsed Drain Current ¹⁾	I_{DM}	52	52	A
Maximum Power Dissipation	P_D	183	52	W
Derating Factor		1.47	0.42	
Avalanche Energy with Single Pulse $I_{AS}=13A, V_{DD}=140V, L=7.5mH$	E_{AS}	633		mJ
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	HY13N50T	HY13N50FT	Units
Junction-to-Case Thermal Resistance	$R_{\theta JC}$	0.68	2.4	$^\circ\text{C/W}$
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}	$V_{GS}=0V \cdot I_D=250\mu A$	500	-	-	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	$R_{DS(on)}$	$V_{GS}=10V \cdot I_D=6.5A$	-	0.44	0.52	Ω
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=500V \cdot V_{GS}=0V$	-	-	10	μA
Gate Body Leakage Current	I_{GSS}	$V_{GS}=\pm 30V \cdot V_{DS}=0V$	-	-	± 100	nA
Dynamic						
Total Gate Charge	Qg	$V_{DS}=400V \cdot I_D=13A$ $V_{GS}=10V$	-	25.2	32	nC
Gate-Source Charge	Qgs		-	6.8	-	
Gate-Drain Charge	Qgd		-	7.6	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=250V \cdot I_D=13A$ $V_{GS}=10V \cdot R_G=25\Omega$	-	26.8	32	ns
Turn-On Rise Time	t_r		-	32	42	
Turn-Off Delay Time	$t_{d(off)}$		-	68	82	
Turn-Off Fall Time	t_f		-	22.6	28	
Input Capacitance	C_{iss}	$V_{DS}=25V \cdot V_{GS}=0V$ $f=1.0M_{HZ}$	-	1450	-	pF
Output Capacitance	C_{oss}		-	190	-	
Reverse Transfer Capacitance	C_{riss}		-	6.5	-	
Source-Drain Diode						
Max. Diode Forwad Voltage	I_S	-	-	-	13	A
Max. Pulsed Source Current	I_{SM}	-	-	-	52	A
Diode Forward Voltage	V_{SD}	$I_S=13A \cdot V_{GS}=0V$	-	-	1.4	V
Reverse Recovery Time	t_{rr}	$V_{GS}=0V \cdot I_S=13A$ $di/dt=100A/\mu s$	-	450	-	ns
Reverse Recovery Charge	Q_{rr}		-	4.5	-	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)

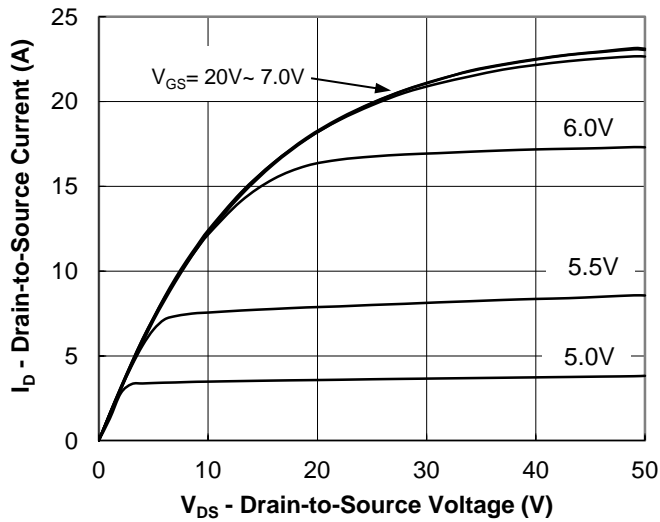


Fig.1 Output Characteristic

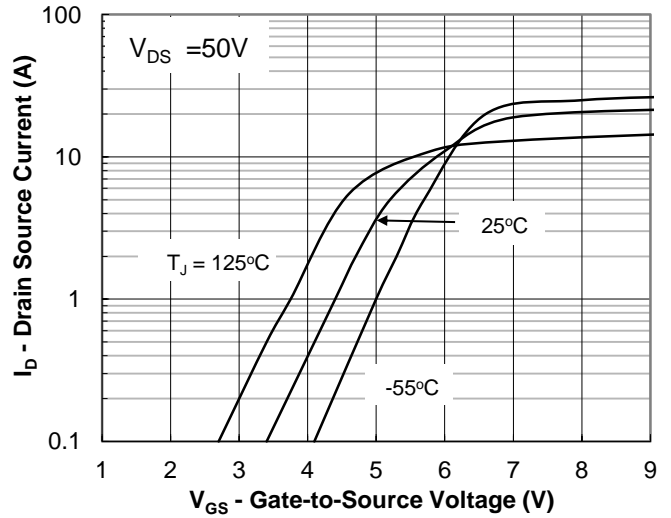


Fig.2 Transfer Characteristic

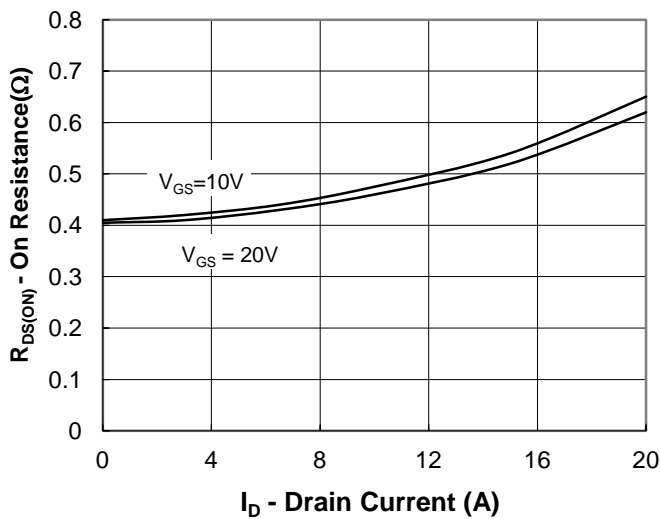


Fig.3 On-Resistance vs Drain Current

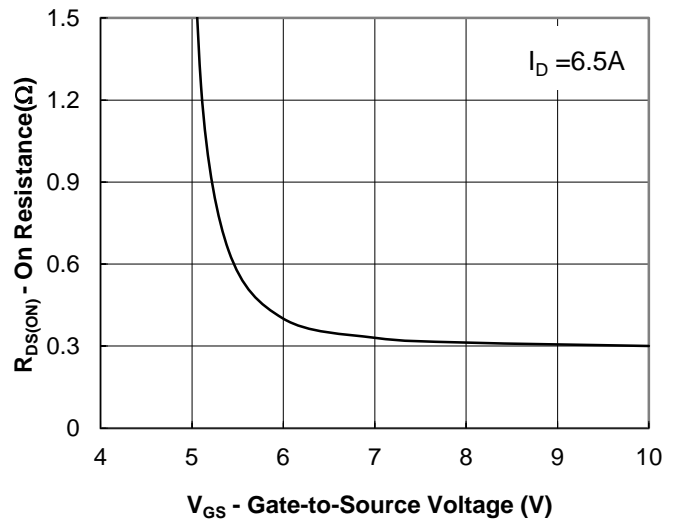


Fig.4 On-Resistance vs Gate to Source Voltage

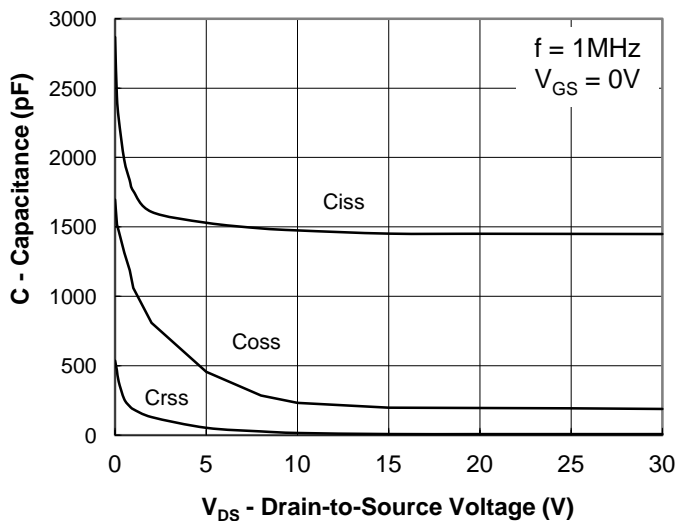


Fig.5 Capacitance Characteristic

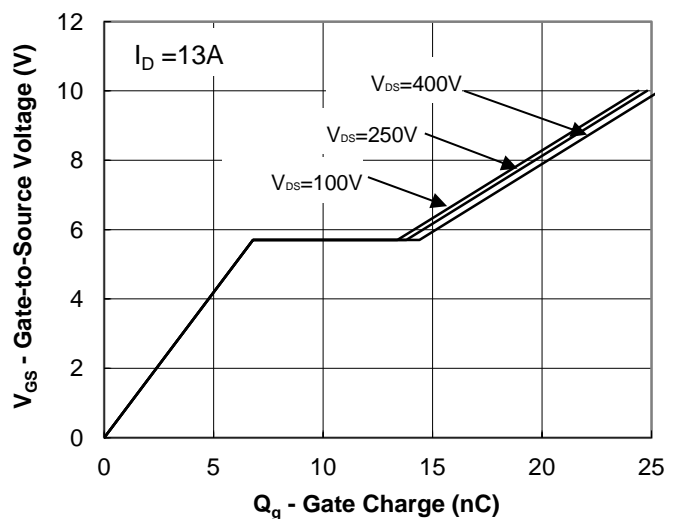


Fig.6 Gate Charge Characteristic

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

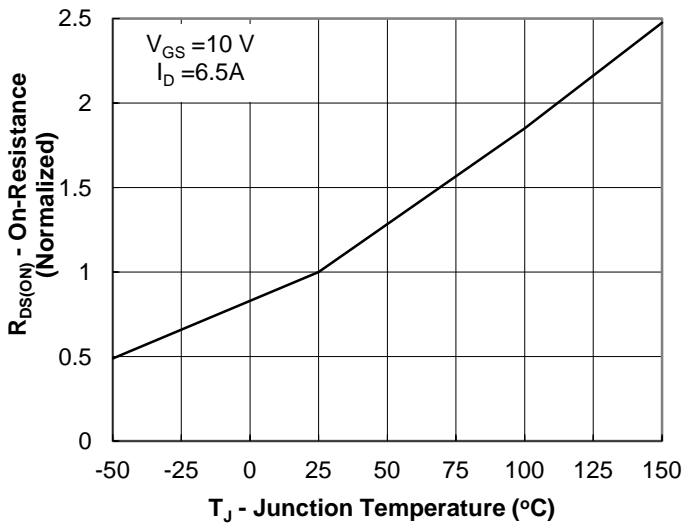


Fig.7 On-Resistance vs Junction Temperature

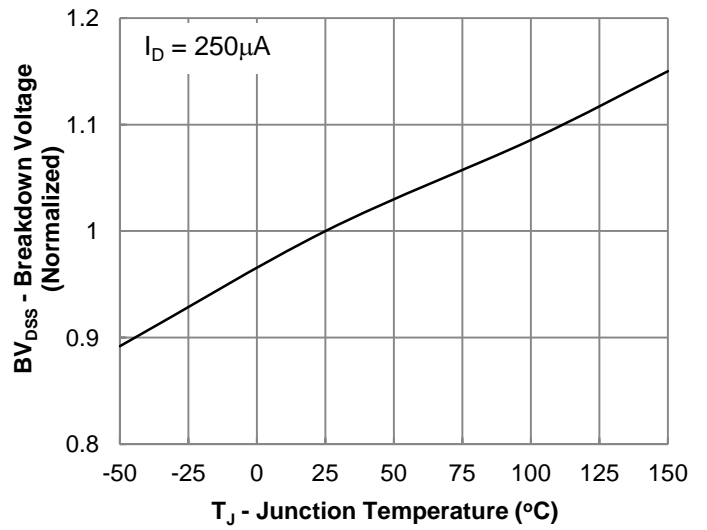


Fig.8 Breakdown Voltage vs Junction Temperature

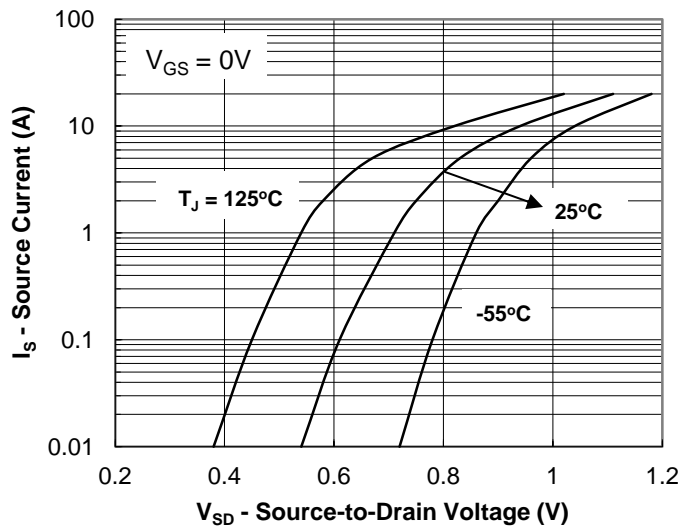


Fig.9 Body Diode Forward Voltage Characteristic