GP13S65YR

POWER FIELD EFFECT TRANSISTOR

GENERAL DESCRIPTION

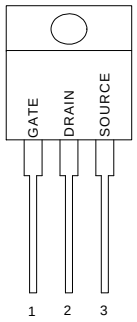
This advanced high voltage MOSFET is designed to withstand high energy in the avalanche mode and switch efficiently. This new high energy device also offers a drain-to-source diode with fast recovery time. Designed for high voltage, high speed switching applications such as power supplies, converters, power motor controls and bridge circuits.

FEATURES

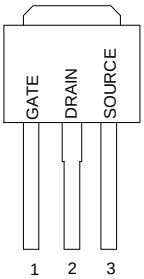
- SJ MOS
- Higher Current Rating
- Lower Rds(on)
- Lower Capacitances
- Lower Total Gate Charge

PIN CONFIGURATION

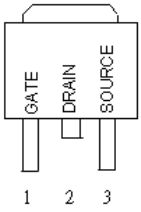
TO-220/TO-220FP Top View



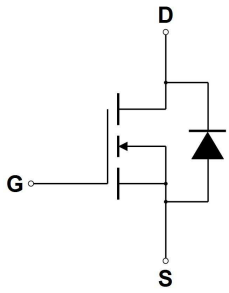
TO-251 Front View



TO-252 Front View



SYMBOL



N-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Drain to Current — Continuous	$I_{D(1)}$	13	A
— Pulsed	I_{DM}	39	
Gate-to-Source Voltage — Continue	V_{GS}	±20	V
Total Power Dissipation TO-251/TO-252	P_D	81	W
TO-220		103	
TO-220FP		35	
Derate above 25℃ TO-251/TO-252		0.65	W/℃
TO-220		0.82	
TO-220FP		0.28	
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	℃
Single Pulse Drain-to-Source Avalanche Energy — T_J = 25℃ (V_{DD} = 100V, V_{GS} = 10V, I_L = 3.6A, L = 10mH)	E_{AS}	64.8	mJ
Thermal Resistance — Junction to Case TO-251/TO-252	θ_{JC}	1.54	℃/W
TO-220		1.21	
TO-220FP		3.6	
— Junction to Ambient TO-251/TO-252/ TO-220/ TO-220FP	θ_{JA}	62.5	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	℃

(1)Drain current limited by maximum junction temperature (TO-220)

ORDERING INFORMATION

Part Number	TOP MARK	Part Number	Packing Mthod	Note
GP13S65YRE (Note1)	GP13S65YR	TO-251	Tube	
GP13S65YRD (Note1)	GP13S65YR	TO-252	Tube	
GP13S65YRDTR (Note1)	GP13S65YR	TO-252	Tape and Reel	
GP13S65YRY (Note1)	GP13S65YR	TO-220	Tube	
GP13S65YRX (Note1)	GP13S65YR	TO-220FP	Tube	

Note1: Halogen Free and PB Free Product

ELECTRICAL CHARACTERISTICS

Unless otherwise specified, T_J = 25℃

			GP13S65YR			
Characteristic		**Symbol**	**Min**	**Typ**	**Max**	**Units**
Drain-Source Breakdown Voltage (V_{GS} = 0V, I_D = 1mA)		$V_{(BR)DSS}$	650			V
Drain-Source Leakage Current (V_{DS} =650V, V_{GS} = 0V)		I_{DSS}			1	uA
Gate-Source Leakage Current-Forward (V_{gsf} = 20V, V_{DS} = 0V)		I_{GSSF}			100	nA
Gate-Source Leakage Current-Reverse (V_{gsr} = - 20V, V_{DS} = 0V)		I_{GSSR}			100	nA
Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = 250μA)		$V_{GS(th)}$	2		4	V
Static Drain-Source On-Resistance (V_{GS} = 10V, I_D = 4.4A) *		$R_{DS(on)}$			380	mΩ
Input Capacitance	(V_{DS} = 100V, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}		568		pF
		C_{oss}		30		pF
Output Capacitance		C_{rss}		3		pF
	(V_{DS} = 400V, V_{GS} = 0 V, f = 1.0 MHz)	C_{iss}		568		pF
Reverse Transfer Capacitance		C_{oss}		22		pF
		C_{rss}		3		pF
Turn-On Delay Time	(V_{DD} = 325V, I_D = 13A, V_{GS} = 10V,R_G = 9.1Ω) *	$t_{d(on)}$		15		ns
Rise Time		t_r		43		ns
Turn-Off Delay Time		$t_{d(off)}$		82		ns
Fall Time		t_f		52		ns
Total Gate Charge	(V_{DS} = 520V, I_D = 13A, V_{GS} = 10V)*	Q_g		21		nC
Gate-Source Charge		Q_{gs}		4		nC
Gate-Drain Charge		Q_{gd}		10		nC
SOURCE-DRAIN DIODE CHARACTERISTICS						
Forward On-Voltage(1)	(I_S = 4.3A, d_{IS}/d_t = 100A/μs)	V_{SD}			1.5	V
Forward Turn-On Time		t_{on}		**		ns
Reverse Recovery Time		t_{rr}		187		ns

* Pulse Test: Pulse Width ≦300μs, Duty Cycle ≦2%

** Negligible, Dominated by circuit inductance

TYPICAL ELECTRICAL CHARACTERISTICS

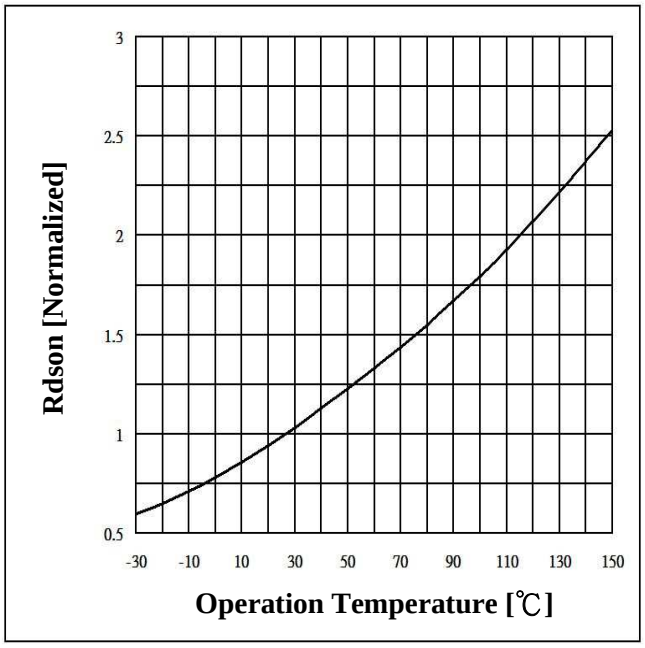


Fig 1. On-Resistance Variation with vs. Temperature

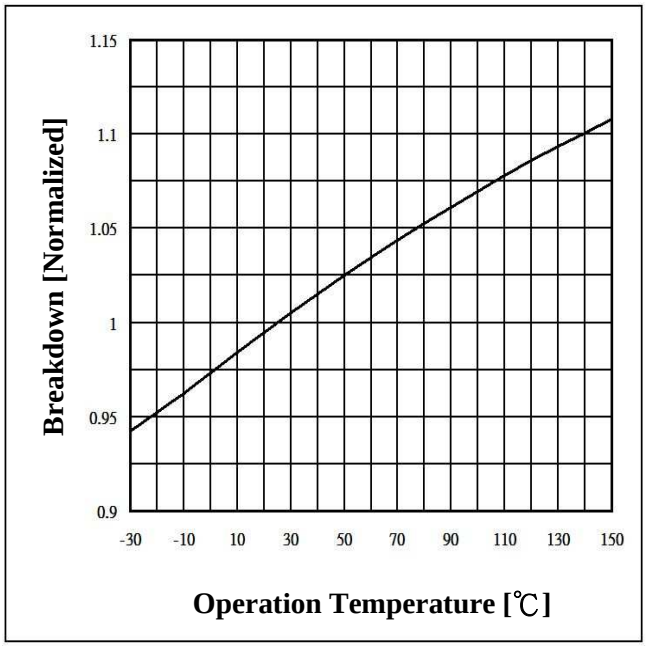


Fig.2 Breakdown Voltage Variation vs. Temperature

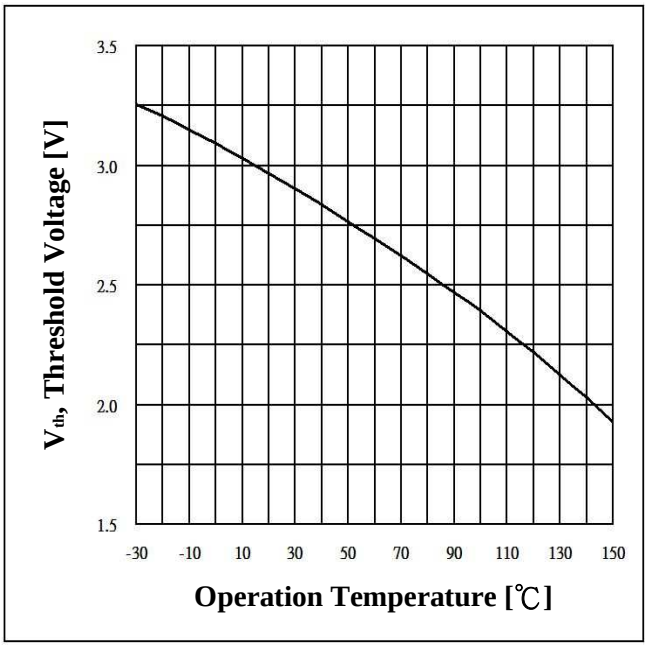


Fig 3. Threshold Voltage vs. Temperature

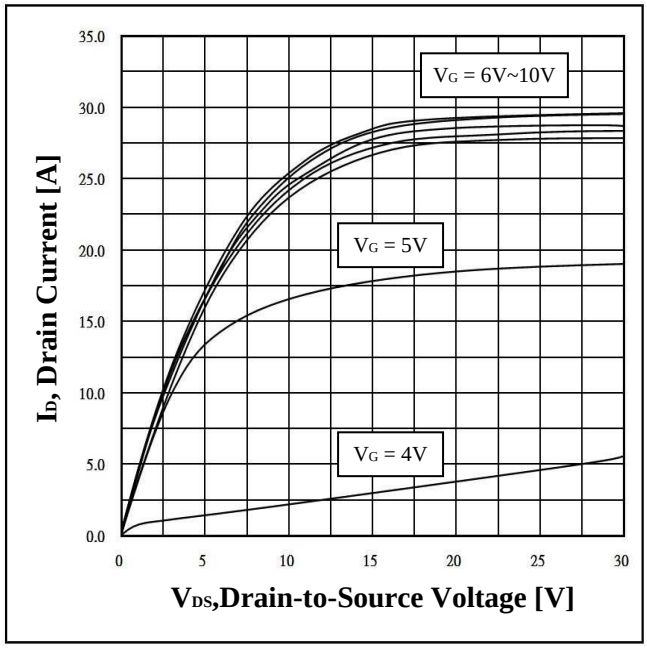


Fig 4.Typical Output Characteristics

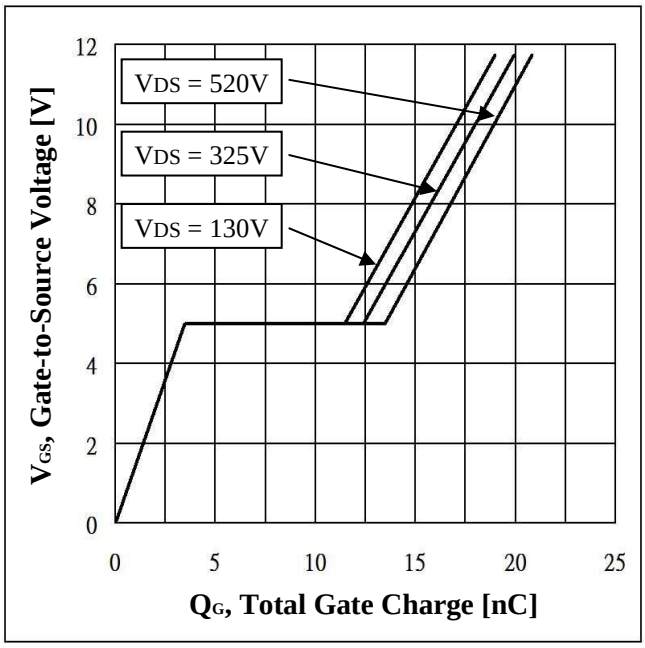


Fig 5. Typical Gate Charge Vs. Gate-to-Source Voltage

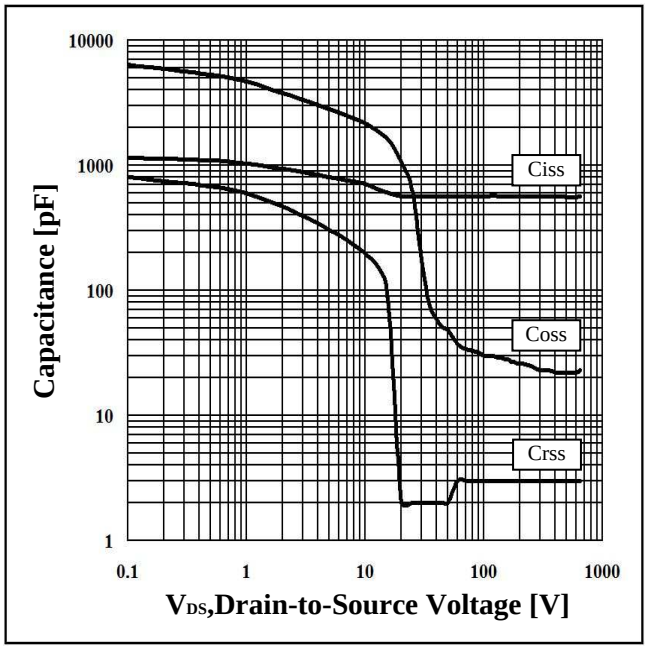


Fig 6. Typical Capacitance Vs. Drain-to-Source Voltage

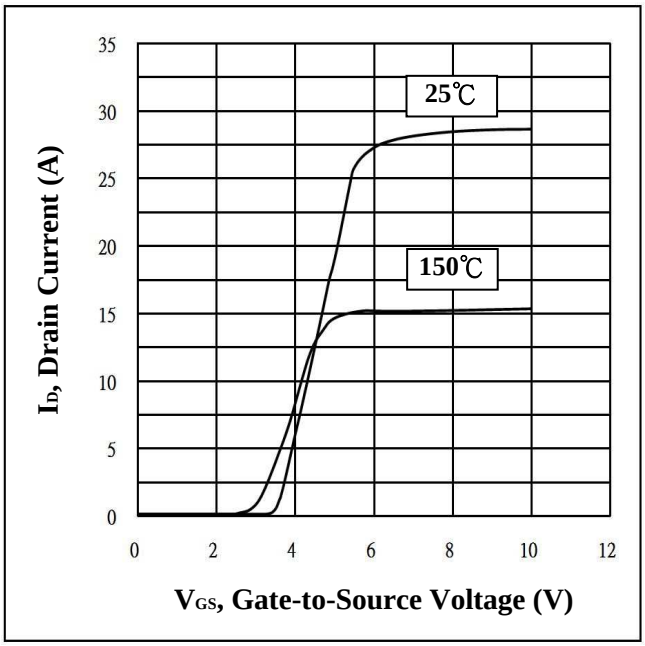


Fig 7. Typical Transfer Characteristics

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