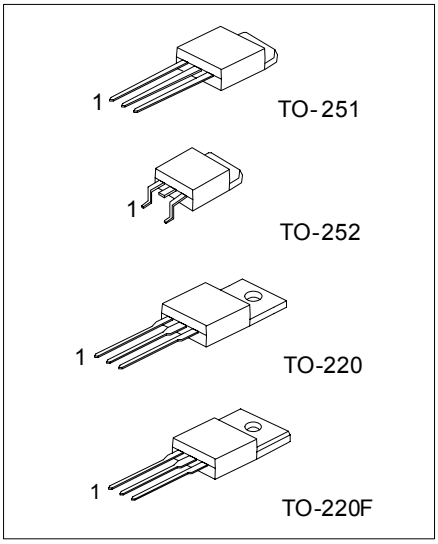
3Amps, 250 Volts
N-CHANNEL MOSFET



*Pb-free plating product number: 3N25

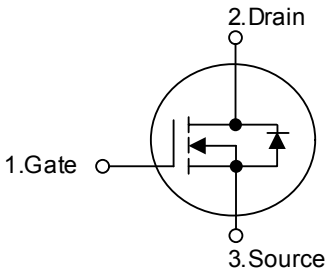
■ DESCRIPTION

The YR 3N25 is a high voltage MOSFET and is designed to have better characteristics, such as fast switching time, low gate charge, low on-state resistance and have a high rugged avalanche characteristics. This power MOSFET is usually used at high speed switching applications in power supplies, PWM motor controls, high efficient DC to DC converters and bridge circuits.

■ FEATURES

* $R_{DS(ON)}$ = 1.74Ω@V_{GS} = 10V.
* Ultra Low gate charge (typical 4.4nC)
* Low reverse transfer capacitance (Crss = typical 5.0 pF)
* Fast switching capability
* Avalanche energy specified
* Improved dv/dt capability, high ruggedness

■ SYMBOL



■ ABSOLUTE MAXIMUM RATINGS (T_C = 25°C, unless otherwise specified)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage		V_{DSS}	250	V
Gate-Source Voltage		V_{GSS}	±30	V
Avalanche Current (Note 2)		I_{AR}	3.0	A
Drain Current Continuous	T_C = 25°C	I_D	3.0	A
	T_C = 100°C		1.98	A
Drain Current Pulsed (Note 2)		I_{DP}	12	A
Avalanche Energy	Repetitive(Note 2)	E_{AR}	10	mJ
	Single Pulse(Note 3)	E_{AS}	305	mJ
Peak Diode Recovery dv/dt (Note 4)		dv/dt	4.5	V/ns
Total Power Dissipation	T_C = 25°C	P_D	101	W
	Derate above 25°C		0.81	W/℃
Junction Temperature		T_J	+150	℃
Storage Temperature		T_{STG}	-55 ~ +150	℃

Note:1. Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Repetitive Rating: Pulse width limited by maximum junction temperature

3. L=64mH, I_{AS}=3.0A, V_{DD}=50V, R_G=25 Ω, Starting T_J = 25°C

4. I_{SD}≤ 3A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C

■ THERMAL DATA

PARAMETER	PACKAGE	SYMBOL	RATINGS	UNIT
Thermal Resistance Junction-Ambient	TO-251	θ_{JA}	62.5	℃/W
	TO-252		62.5	
	TO-220		62.5	
	TO-220F		62.5	
Thermal Resistance Junction-Case	TO-251	θ_{Jc}	4.68	
	TO-252		4.68	
	TO-220		2.87	
	TO-220F		2.87	

■ ELECTRICAL CHARACTERISTICS (T_J =25°C, unless Otherwise specified.)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Off Characteristics							
Drain-Source Breakdown Voltage		BV_{DSS}	V_{GS} = 0V, I_D = 250μA	250			V
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS} = 250V, V_{GS} = 0V			1	μA
			V_{DS} = 200V, T_C = 125°C			10	μA
Gate-Body Leakage Current	Forward	I_{GSS}	V_{GS} = 30V, V_{DS} = 0V			100	nA
	Reverse		V_{GS} = -30V, V_{DS} = 0V			-100	nA
Breakdown Voltage Temperature Coefficient		$\triangle BV_{DSS}/\triangle T_J$	I_D = 250 μA		0.64		V/ ℃
On Characteristics							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS} = V_{GS}, I_D = 250μA	3.0		5.0	V
Static Drain-Source On-Resistance		$R_{DS(ON)}$	V_{GS} = 10V, I_D =1.5A		1.5	1.74	Ω
Forward Transconductance		g_{FS}	V_{DS} = 40V, I_D = 1.5A (Note 4)		1.5		S
Dynamic Characteristics							
Input Capacitance		C_{ISS}	V_{DS} =25V, V_{GS} =0V, f =1MHz	-	130	170	pF
Output Capacitance		C_{OSS}			40	50	pF
Reverse Transfer Capacitance		C_{RSS}		-	4.5	5.8	pF

■ ELECTRICAL CHARACTERISTICS(Cont.)

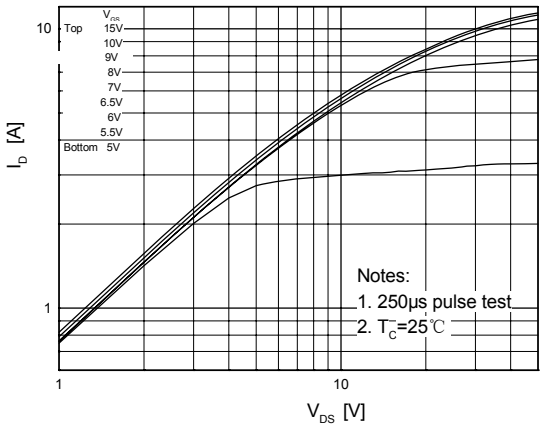
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Switching Characteristics						
Turn-On Delay Time	$t_{D\ (ON)}$	V_{DD} =125V, I_D =3.0A, R_G=25Ω (Note 4,5)		12	23	ns
Rise Time	t_R			25	26	ns
Turn-Off Delay Time	$t_{D(OFF)}$			6	20	ns
Fall Time	t_F			20	48	ns
Total Gate Charge	Q_G	V_{DS}=200V, V_{GS}=10V, I_D=3.0A (Note 4, 5)		4.4	6	nC
Gate-Source Charge	Q_{GS}			1.3		nC
Gate-Drain Charge	Q_{GD}			1.8		nC
Drain-Source Diode Characteristics						
Drain-Source Diode Forward Voltage	V_{SD}	V_{GS} = 0 V, I_{SD} = 3.0 A			1.4	V
Continuous Drain-Source Current	I_{SD}				3.0	A
Pulsed Drain-Source Current	I_{SM}				12	A
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, I_{SD} = 1.8A, di/dt = 100 A/μs (Note1)	-	100	-	ns
Reverse Recovery Charge	Q_{RR}			0.3		μC

Note: 1. Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%

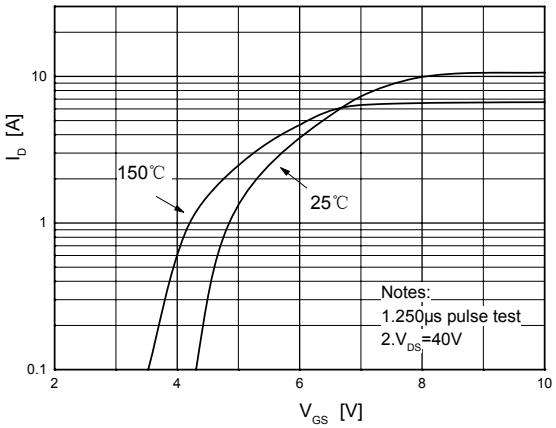
2. Essentially Independent of Operating Temperature

■ TEST CIRCUITS AND WAVEFORMS

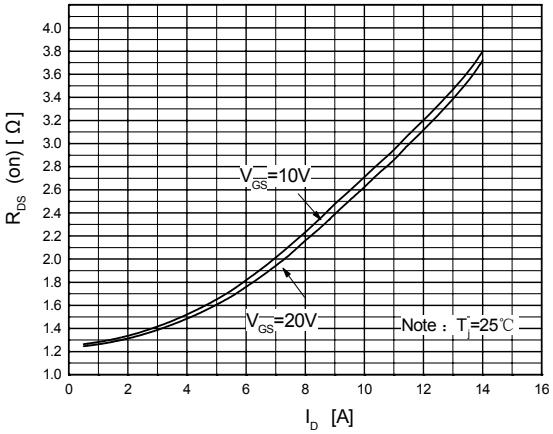
On-Region Characteristics



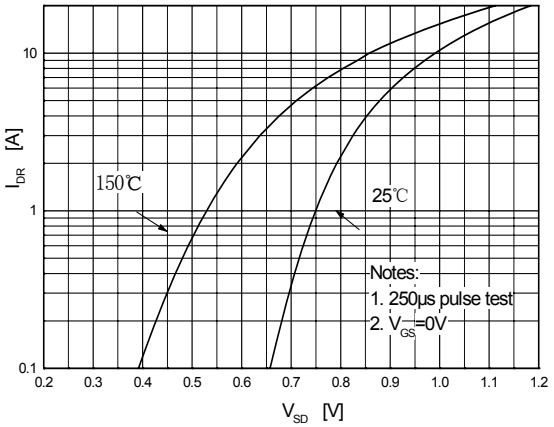
Transfer Characteristics



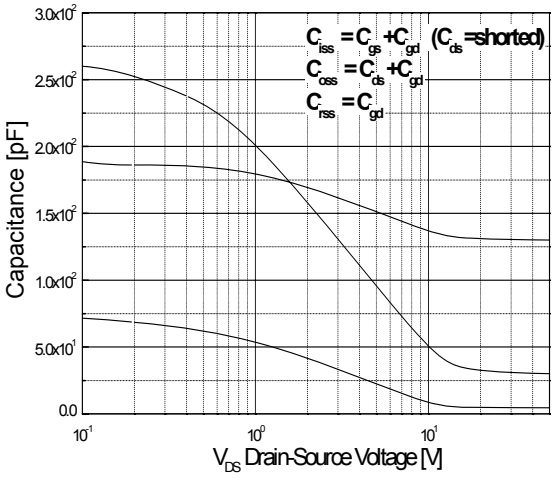
On-Resistance Variation vs. Drain Current and Gate Voltage



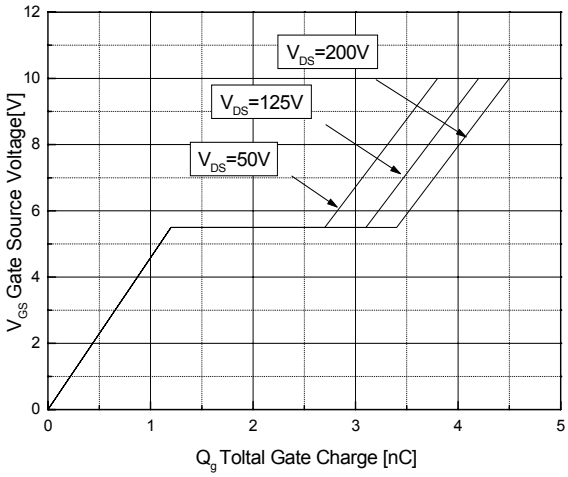
Body Diode Forward Voltage Variation vs. Source Current and Temperature



Capacitance Characteristics

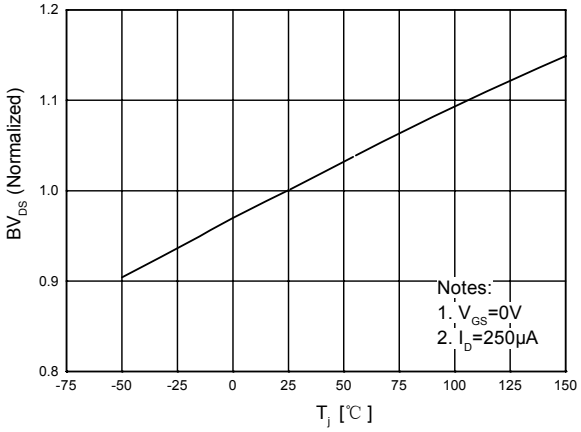


Gate Charge Characteristics

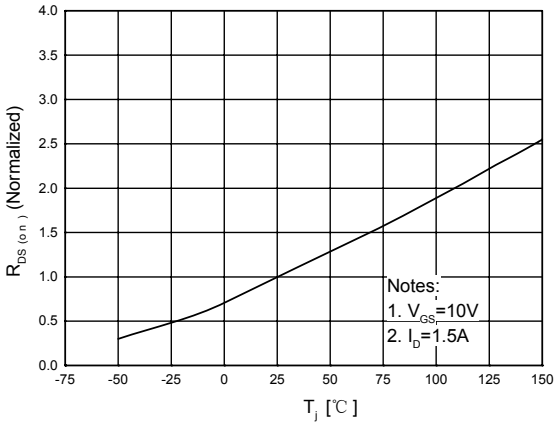


■ TEST CIRCUITS AND WAVEFORMS (Cont.)

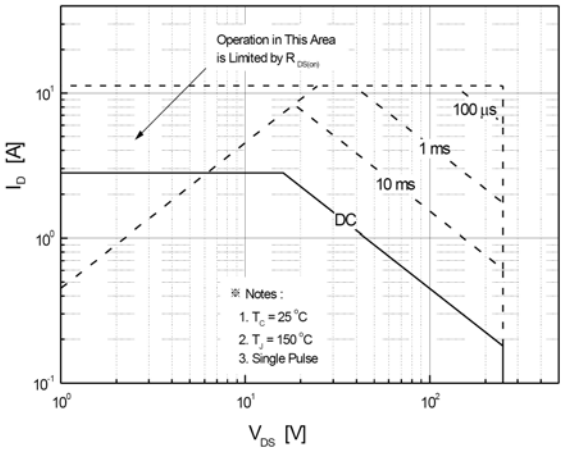
Breakdown Voltage Variation vs. Temperature



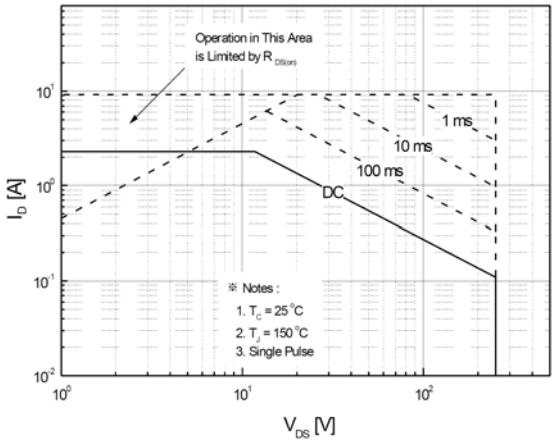
On-Resistance Variation vs. Temperature



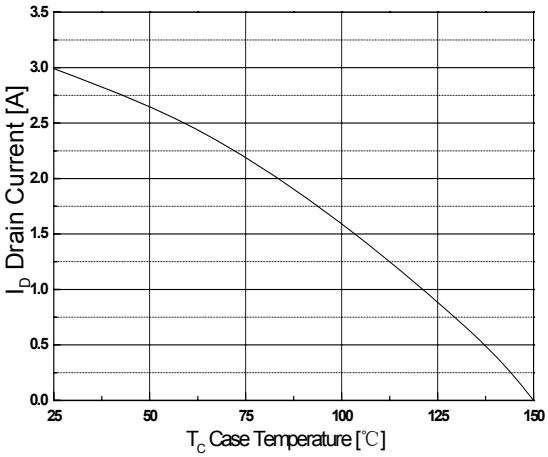
Maximum Safe Operating Area For 3N25 V T/RT/CT



Maximum Safe Operating Area For3N25FT

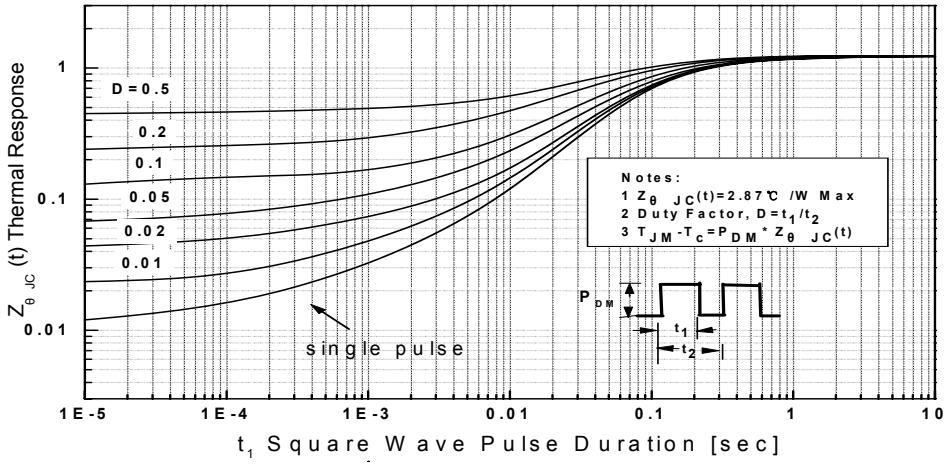


Maximum Drain Current vs. Case Temperature



■ TYPICAL CHARACTERISTICS

Transient Thermal Response Curve For 3N25VT/RT/CT



Transient Thermal Response Curve For 3N25FT