

ELECTRICAL SPECIFICATIONS (at 25°C unless noted) 2N3027 — 2N3028 — 2N3029

Parameter	Symbol	Min.	Typical	Max.	Units	Test Conditions
SUBGROUP 1 Visual and Mechanical	—	—	—	—	—	MIL-STD-750 Method 2071
SUBGROUP 2 (25°C Tests)						
Off-State Current	I_{DRM}	—	.002	0.1	μA	$R_{GK} = 1K, V_{DRM} = \text{Rating}$
Reverse Current	I_{RRM}	—	.002	0.1	μA	$R_{GK} = 1K, V_{RRM} = \text{Rating}$
Reverse Gate Voltage	V_{GR}	5	8	—	V	$I_{GR} = 0.1mA$
Gate Trigger Current	I_{GT}	-5	8	200	μA	$R_{GS} = 10K, V_D = 5V$
Gate Trigger Voltage	V_{GT}	.40	.55	.80	V	$R_{GS} = 100\Omega, V_D = 5V$
On-State Voltage	V_T	0.8	1.2	1.5	V	$I_T = 1A$ (pulse test)
Holding Current	I_H	0.3	0.7	5.0	mA	$R_{GK} = 1K, V_D = 5V$
SUBGROUP 3 (25°C Tests)						
Off-State Voltage — Critical Rate of Rise	dv_e/dt	30 15 10	60 30 25	—	V/ μs	$R_{GK} = 1K, V_D = 30V$ (2N3027) $R_{GK} = 1K, V_D = 60V$ (2N3028) $R_{GK} = 1K, V_D = 100V$ (2N3029)
Gate Trigger-on Pulse Width	$t_{pg(on)}$	—	.07	0.2	μs	$I_G = 10mA, I_T = 1A, V_{DM} = 30V$
Delay Time	t_d	—	.08	—	μs	$I_G = 10mA, I_T = 1A, V_D = 30V$
Rise Time	t_r	—	.04	—	μs	$I_G = 10mA, I_T = 1A, V_D = 30V$
Circuit Commutated Turn-off Time	t_q	—	0.7	2.0	μs	$I_T = 1A, I_R = 1A, R_{GK} = 1K$
SUBGROUP 4 (150°C Tests)						
High Temp. Off-State Current	I_{DRM}	—	2	20	μA	$R_{GK} = 1K, V_{DRM} = \text{Rating}$
High Temp. Reverse Current	I_{RRM}	—	20	50	μA	$R_{GK} = 1K, V_{RRM} = \text{Rating}$
High Temp. Gate Trigger Voltage	V_{GT}	.10	.15	0.6	V	$R_{GS} = 100\Omega, V_D = 5V$
High Temp. Holding Current	I_H	.05	.20	1.0	mA	$R_{GK} = 1K, V_D = 5V$
SUBGROUP 5 (-65°C Tests)						
Low Temp. Gate Trigger Voltage	V_{GT}	0.6	0.75	1.1	V	$R_{GS} = 100\Omega, V_D = 5V$
Low Temp. Gate Trigger Current	I_{GT}	0	150	1.2	mA	$R_{GS} = 10K, V_D = 5V$
Low Temp. Holding Current	I_H	0.5	3.5	10	mA	$R_{GK} = 1K, V_D = 5V$

ELECTRICAL SPECIFICATIONS (at 25°C unless noted) 2N3030 — 2N3031 — 2N3032

Parameter	Symbol	Min.	Typical	Max.	Units	Test Conditions
SUBGROUP 1 Visual and Mechanical	—	—	—	—	—	MIL-STD-750 Method 2071
SUBGROUP 2 (25°C Tests)						
Off-State Current	I_{DRM}	—	.002	0.1	μA	$R_{GK} = 1K, V_{DRM} = \text{Rating}$
Reverse Current	I_{RRM}	—	.002	0.1	μA	$R_{GK} = 1K, V_{RRM} = \text{Rating}$
Reverse Gate Voltage	V_{GR}	5	8	—	V	$I_{GR} = 0.1mA$
Gate Trigger Current	I_{GT}	-5	20	—	μA	$R_{GS} = 10K, V_D = 5V$
Gate Trigger Voltage	V_{GT}	0.44	0.6	—	V	$R_{GS} = 100\Omega, V_D = 5V$
On-State Voltage	V_T	0.8	1.2	1.5	V	$I_T = 1A$ (pulse test)
Holding Current	I_H	0.3	1.0	4.0	mA	$R_{GK} = 1K, V_D = 5V$
SUBGROUP 3 (25°C Tests)						
Off-State Voltage — Critical Rate of Rise	dv_e/dt	30 15 10	60 30 25	—	V/ μs	$R_{GK} = 1K, V_D = 30V$ (2N3030) $R_{GK} = 1K, V_D = 60V$ (2N3031) $R_{GK} = 1K, V_D = 100V$ (2N3032)
Gate Trigger-on Pulse Width	$t_{pg(on)}$	—	.05	0.1	μs	$I_G = 10mA, I_T = 1A, V_D = 30V$
Delay Time	t_d	—	.01	—	μs	$I_G = 10mA, I_T = 1A, V_D = 30V$
Rise Time	t_r	—	.05	—	μs	$I_G = 10mA, I_T = 1A, V_D = 30V$
Circuit Commutated Turn-off Time	t_q	—	0.7	2.0	μs	$I_T = 1A, I_R = 1A, R_{GK} = 1K$
SUBGROUP 4 (150°C Tests)						
High Temp. Off-State Current	I_{DRM}	—	2	20	μA	$R_{GK} = 1K, V_{DRM} = \text{Rating}$
High Temp. Reverse Current	I_{RRM}	—	20	50	μA	$R_{GK} = 1K, V_{RRM} = \text{Rating}$
High Temp. Gate Trigger Voltage	V_{GT}	.10	.15	0.4	V	$R_{GS} = 100\Omega, V_D = 5V$
High Temp. Holding Current	I_H	.05	.30	2.0	mA	$R_{GK} = 1K, V_D = 5V$
SUBGROUP 5 (-65°C Tests)						
Low Temp. Gate Trigger Voltage	V_{GT}	0.44	0.8	0.95	V	$R_{GS} = 100\Omega, V_D = 5V$
Low Temp. Gate Trigger Current	I_{GT}	0	0.4	0.5	mA	$R_{GS} = 10K, V_D = 5V$
Low Temp. Holding Current	I_H	0.5	5.0	8	mA	$R_{GK} = 1K, V_D = 5V$

High Reliability Processing

The 2N3027-2N3032 series provides a complete range of high reliability processing from the standard devices that undergo extensive electrical testing, through JAN and JANTX levels. 100% processing, Group B, and Group C tests for JAN and JANTX devices is shown below. For further details, see MIL-S-19500/419(EL).

100% Screening TX-Types

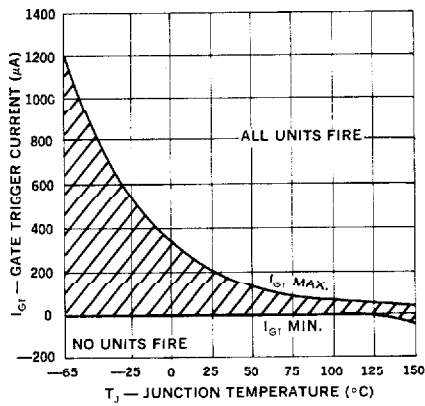
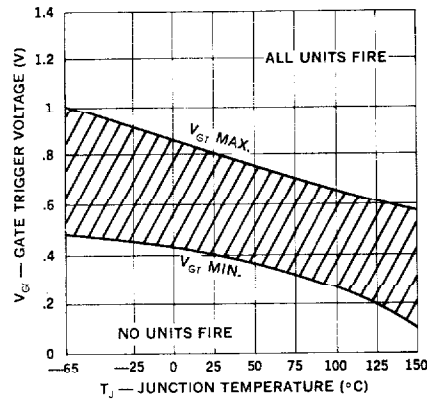
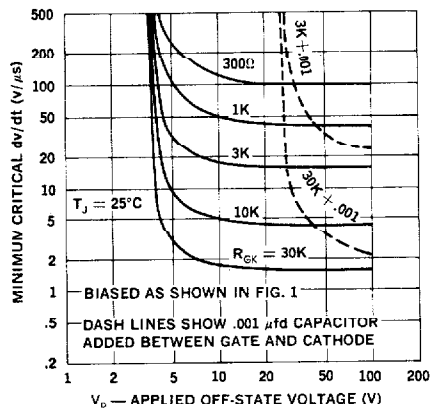
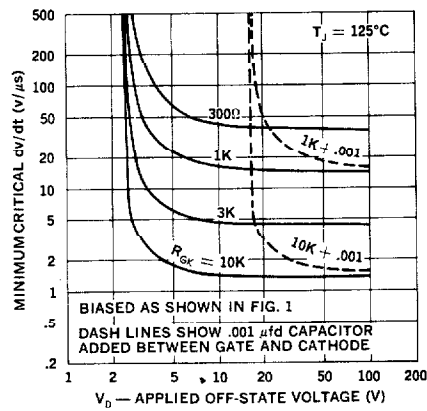
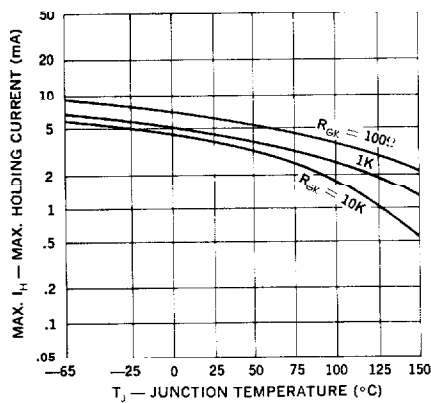
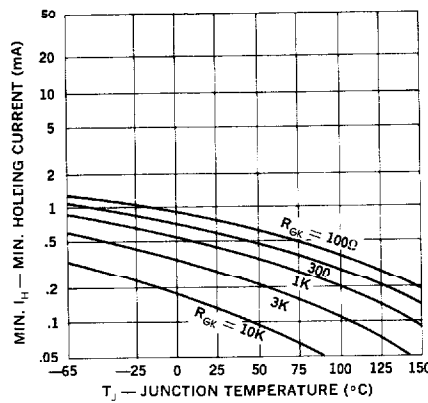
High Temperature Storage
Temperature Cycling
Constant Acceleration
Fine & Gross Hermetic Seal
Electrical Test
Burn-in
Electrical Test

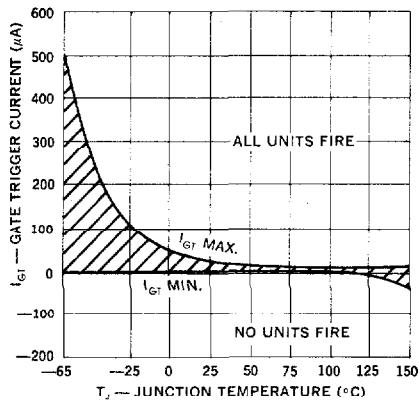
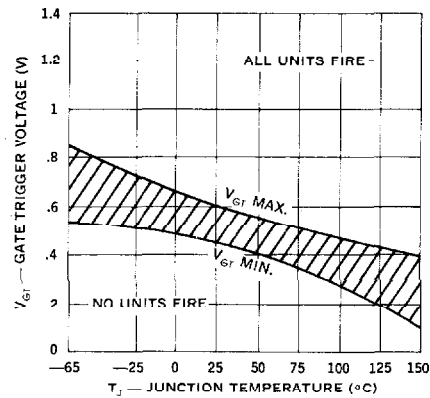
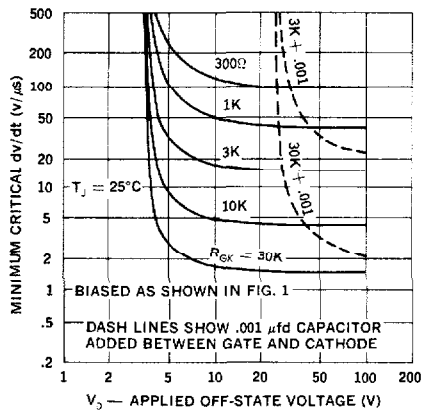
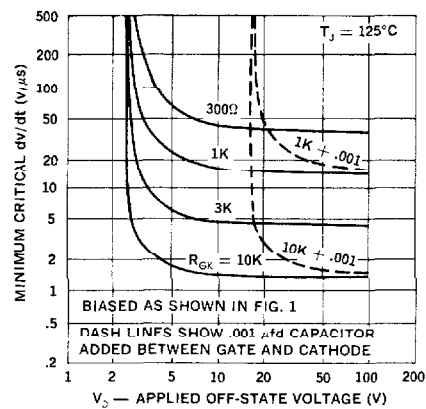
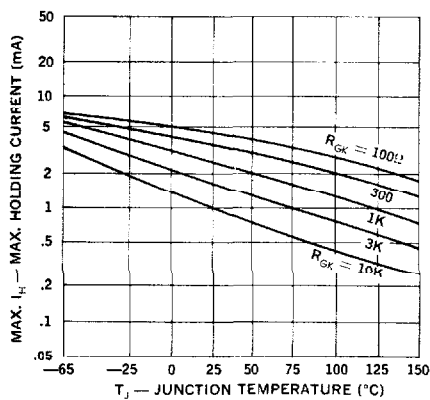
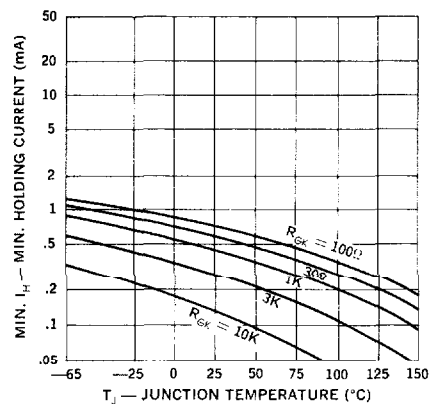
Group B Tests

Subgroup 1 — Physical Dimensions
Subgroup 2 — Solderability
Temperature Cycling
Thermal Shock
Constant Acceleration
Moisture Resistance
Subgroup 3 — Surge Current
Subgroup 4 — Blocking Life Test
Subgroup 5 — Storage Life Test
Subgroup 6 — Operating Life Test

Group C Tests

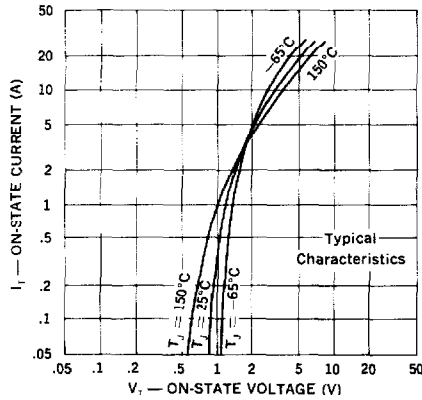
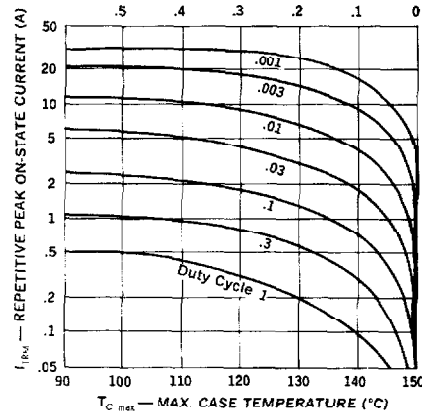
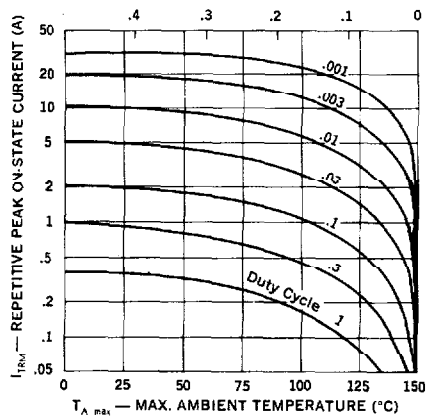
Subgroup 1 — Shock
Vibration, Variable Frequency
Subgroup 2 — Salt Atmosphere
Subgroup 3 — Terminal Strength
Subgroup 4 — High Temp. Anode Voltage — Critical rate or rise
Subgroup 5 — Storage Life Test
Subgroup 6 — Operating Life Test

TYPICAL CHARACTERISTICS
2N3027 — 2N3028 — 2N3029
1 Gate Trigger Current**2 Gate Trigger Voltage****3 Min. Critical dv/dt (25°C — R Bias)****4 Min. Critical dv/dt (125°C — R Bias)****5 Max. Holding Current (Resistor Bias)****6 Min. Holding Current (Resistor Bias)**

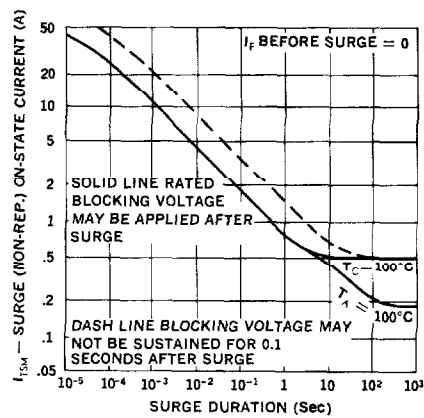
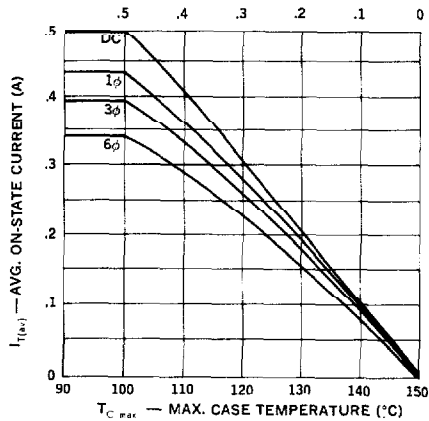
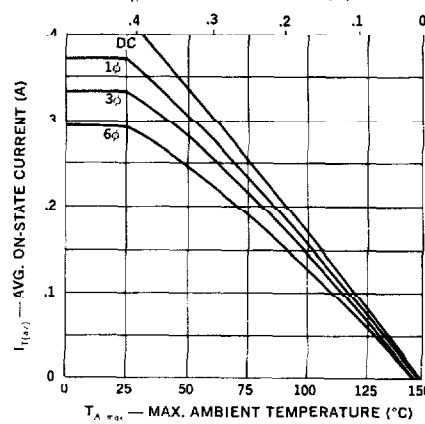
TYPICAL CHARACTERISTICS
2N3030 — 2N3031 — 2N3032
1 Gate Trigger Current**2 Gate Trigger Voltage****3 Min. Critical dv/dt (25°C — R Bias)****4 Min. Critical dv/dt (125°C — R Bias)****5 Max. Holding Current (Resistor Bias)****6 Min. Holding Current (Resistor Bias)**

CURRENT RATINGS

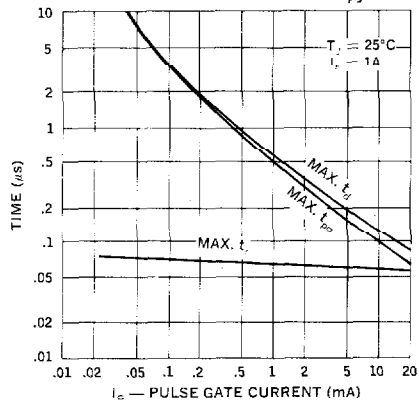
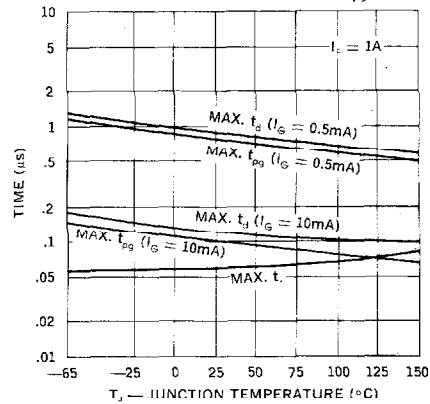
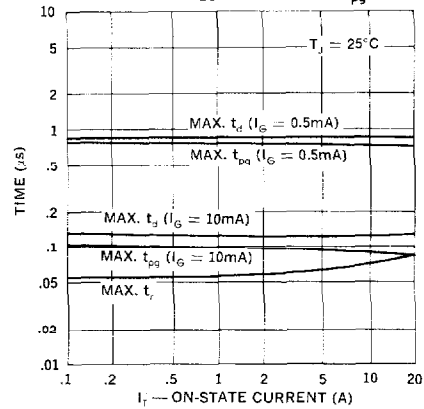
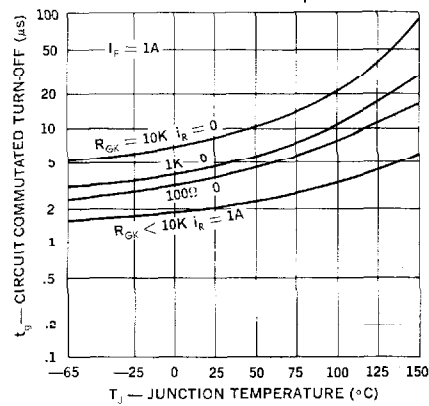
C1 Forward on Current vs. Voltage

C2 Peak Current vs. Case Temperature
 P_A — POWER DISSIPATION (W)C3 Peak Current vs. Ambient Temperature
TO-18 Ratings (see note)
 P_A — POWER DISSIPATION (W)

C4 Surge Current vs. Time

C5 Average Current vs. Case Temperature
 P_A — POWER DISSIPATION (W)C6 Average Current vs. Ambient Temperature
TO-18 Ratings (see note)
 P_A — POWER DISSIPATION (W)

SWITCHING SPEEDS

S1 Maximum Delay Time t_d , Rise Time t_r , and Gate Trigger Pulse Width t_{pg} (on)S2 Maximum Delay Time t_d , Rise Time t_r , and Gate Trigger Pulse Width t_{pg} (on)S3 Maximum Delay Time t_d , Rise Time t_r , and Gate Trigger Pulse Width t_{pg} (on)S4 Maximum Circuit Commutated Turn-off Time t_q S5 Maximum Circuit Commutated Turn-off Time t_q 