

N-Channel Power MOSFET

600V, 11A, 390mΩ

FEATURES

- Super-Junction technology
- High performance due to small figure-of-merit
- High ruggedness performance
- High commutation performance
- 100% UIS & Rg tested
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

KEY PERFORMANCE PARAMETERS

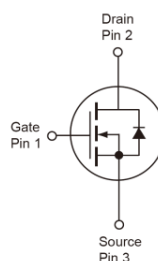
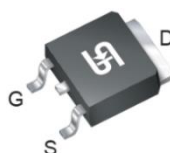
PARAMETER	VALUE	UNIT
V_{DS}	600	V
$R_{DS(on)}$ (max)	390	mΩ
Q_g	21	nC

APPLICATIONS

- Power Supply
- Lighting



TO-252 (DPAK)



Note: MSL 3 (Moisture Sensitivity Level) per J-STD-020

ABSOLUTE MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$ unless otherwise noted)

2N2222E NPN Silicon Transistor (NPN, TO-18, 300mA Collector Current, 250MHz f _T)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		V _{DS}	600	V
Gate-Source Voltage		V _{GS}	±20	V
Continuous Drain Current (Note 1)	T _C = 25°C	I _D	11	A
	T _C = 100°C		7	A
Pulsed Drain Current (Note 2)		I _{DM}	33	A
Total Power Dissipation @ T _C = 25°C		P _D	125	W
Single Pulse Avalanche Energy (Note 3)		E _{AS}	300	mJ
Single Pulse Avalanche Current (Note 3)		I _{AS}	3.5	A
Operating Junction and Storage Temperature Range		T _J , T _{STG}	- 55 to +150	°C

THERMAL PERFORMANCE

PARAMETER	SYMBOL	LIMIT	UNIT
Junction to Case Thermal Resistance	$R_{\theta JC}$	1	$^\circ\text{C/W}$
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	50	$^\circ\text{C/W}$

Note: Device on a PCB FR4 with 1 in² (single layer, 2 oz thickness) copper area for drain connection.

ELECTRICAL SPECIFICATIONS (T _A = 25°C unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static (Note 4)						
Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 1mA	BV _{DSS}	600	--	--	V
Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 1mA	V _{GS(TH)}	3	4.5	5	V
Gate Body Leakage	V _{GS} = ± 20V, V _{DS} = 0V	I _{GSS}	--	--	±100	nA
Zero Gate Voltage Drain Current	V _{DS} = 600V, V _{GS} = 0V	I _{DSS}	--	--	100	μA
Drain-Source On-State Resistance	V _{GS} = 10V, I _D = 3.8A	R _{DS(on)}	--	350	390	mΩ
Dynamic (Note 5)						
Total Gate Charge	V _{DS} = 300V, I _D = 9A, V _{GS} = 10V	Q _g	--	21	--	nC
Gate-Source Charge		Q _{gs}	--	6	--	
Gate-Drain Charge		Q _{gd}	--	10	--	
Input Capacitance	V _{DS} = 300V, V _{GS} = 0V, f = 1.0MHz	C _{iss}	--	783	--	pF
Output Capacitance		C _{oss}	--	27	--	
Reverse Transfer Capacitance		C _{rss}	--	13	--	
Gate Resistance	f = 1.0MHz	R _g	0.6	2	4	Ω
Switching (Note 6)						
Turn-On Delay Time	V _{DD} = 300V, R _G = 10Ω, I _D = 5.5A, V _{GS} = 10V	t _{d(on)}	--	22	--	ns
Turn-On Rise Time		t _r	--	26	--	
Turn-Off Delay Time		t _{d(off)}	--	41	--	
Turn-Off Fall Time		t _f	--	19	--	
Source-Drain Diode (Note 4)						
Body-Diode Continuous Forward Current		I _S	--	--	11	A
Body-Diode Pulsed Current		I _{SM}	--	--	33	A
Forward Voltage	I _S = 11A, V _{GS} = 0V	V _{SD}	--	--	1.5	V
Reverse Recovery Time	I _S = 11A	t _{rr}	--	324	--	ns
Reverse Recovery Charge	dI _F /dt = 100A/μs	Q _{rr}	--	4.8	--	μC

Notes:

- Current limited by package.
- Pulse width limited by the maximum junction temperature.
- $L = 50mH, V_{DD} = 50V, R_G = 25\Omega$, Starting $T_J = 25^\circ\text{C}$
- Pulse test: $PW \leq 300\mu s$, duty cycle $\leq 2\%$.
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.

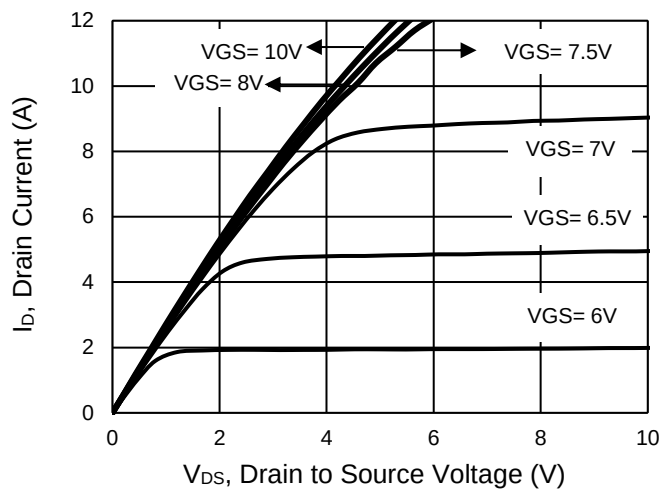
ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
TSM60NC390CP ROG	TO-252 (DPAK)	2,500pcs / 13" Reel

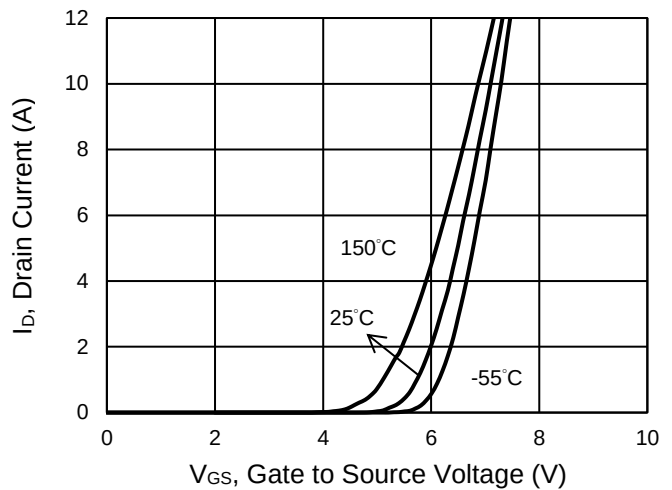
CHARACTERISTICS CURVES

($T_c = 25^\circ\text{C}$ unless otherwise noted)

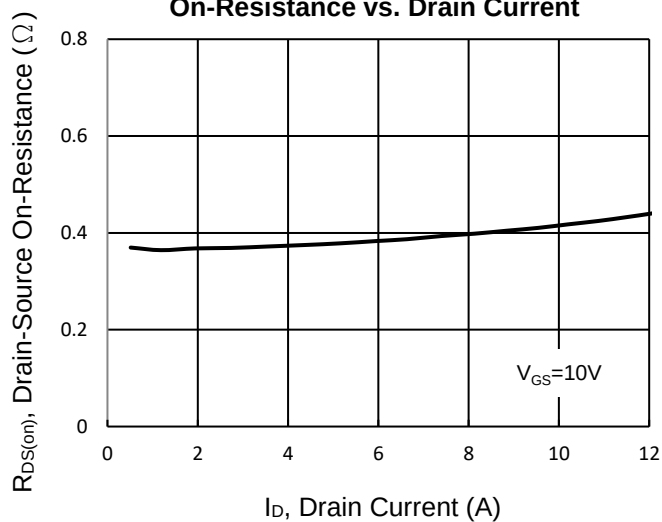
Output Characteristics



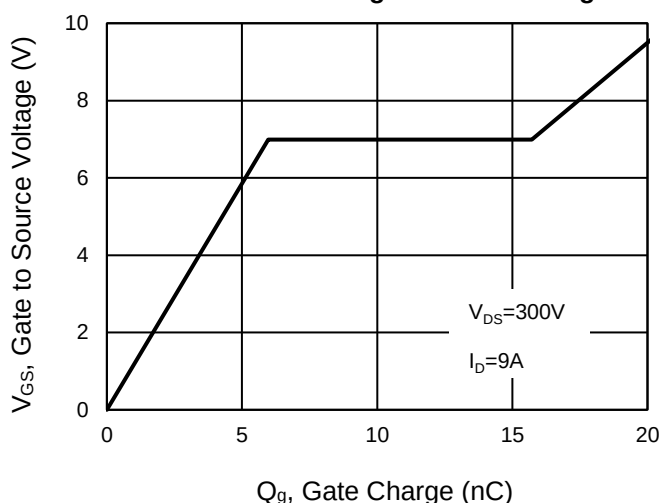
Transfer Characteristics



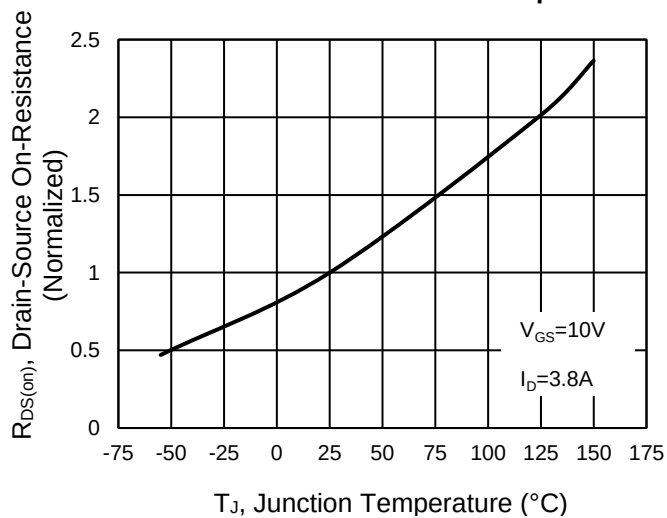
On-Resistance vs. Drain Current



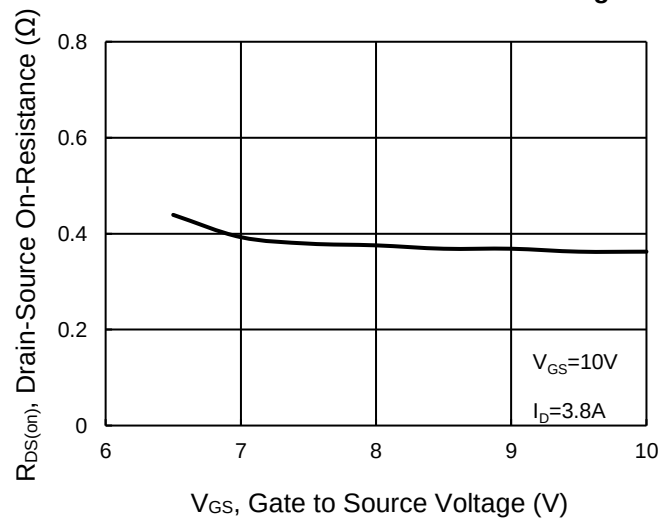
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature

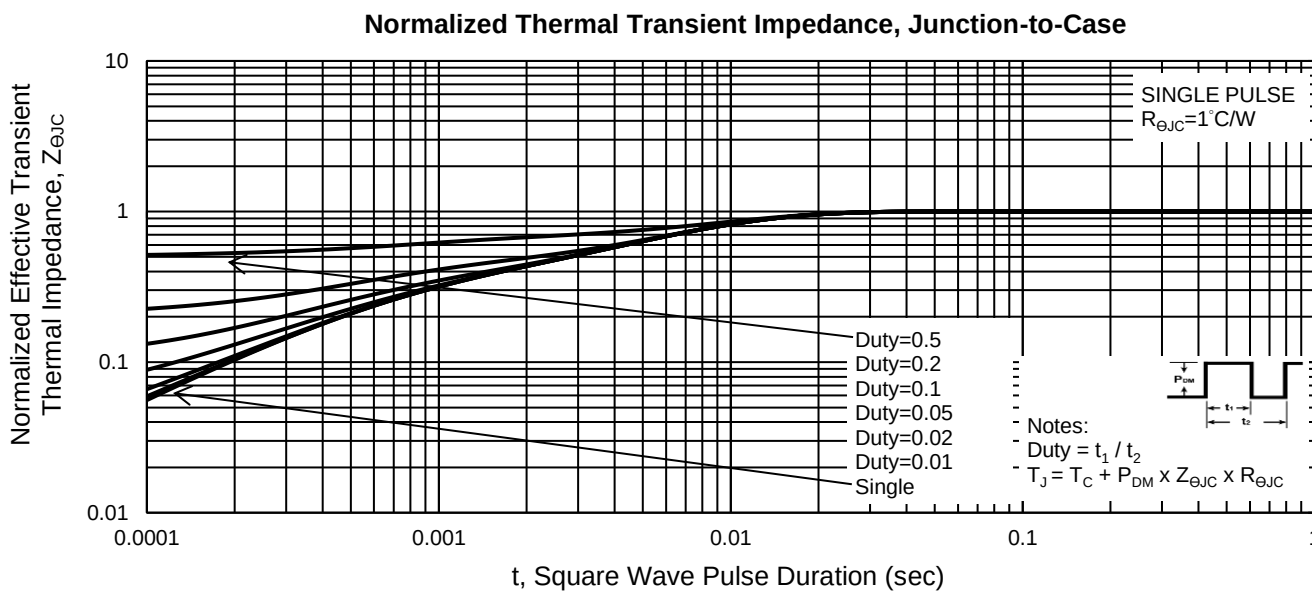
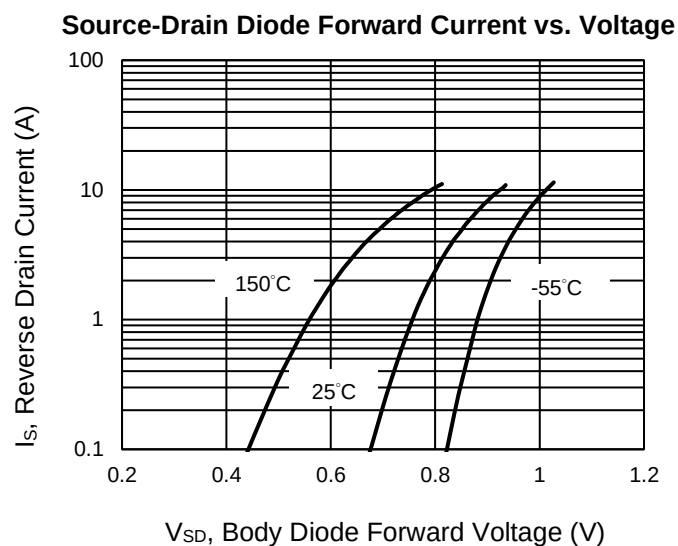
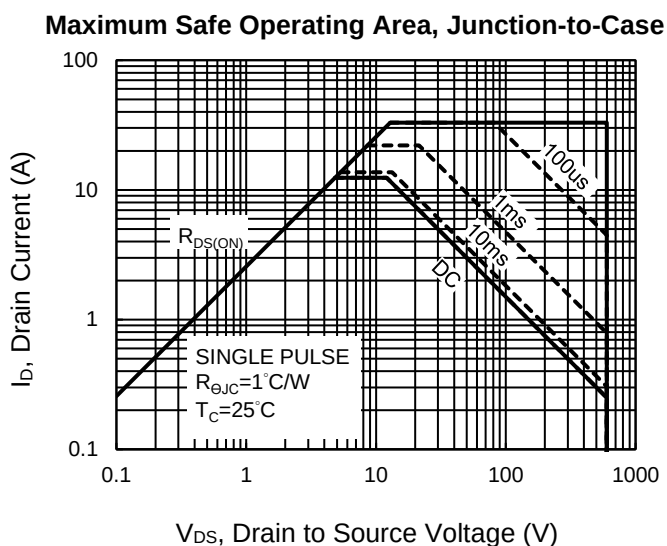
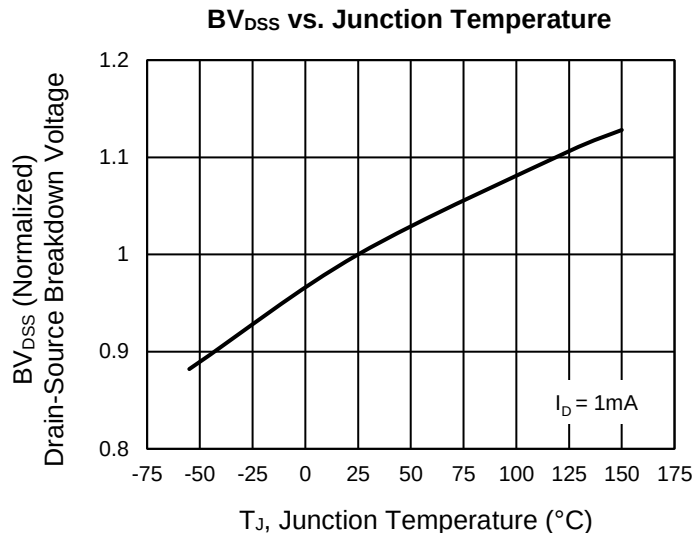
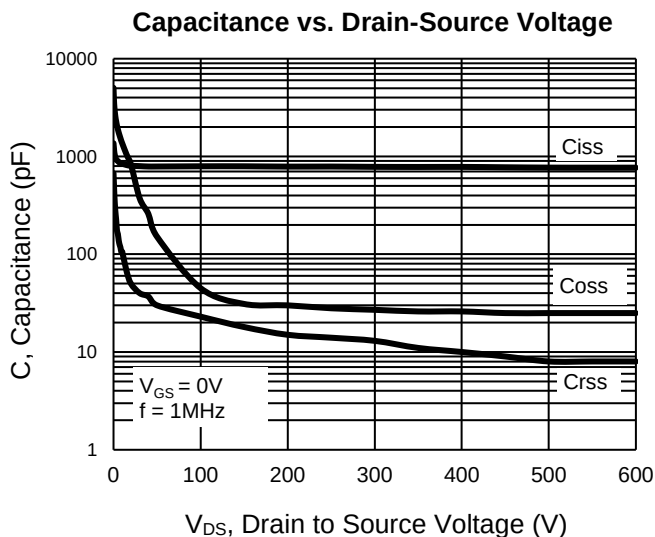


On-Resistance vs. Gate-Source Voltage



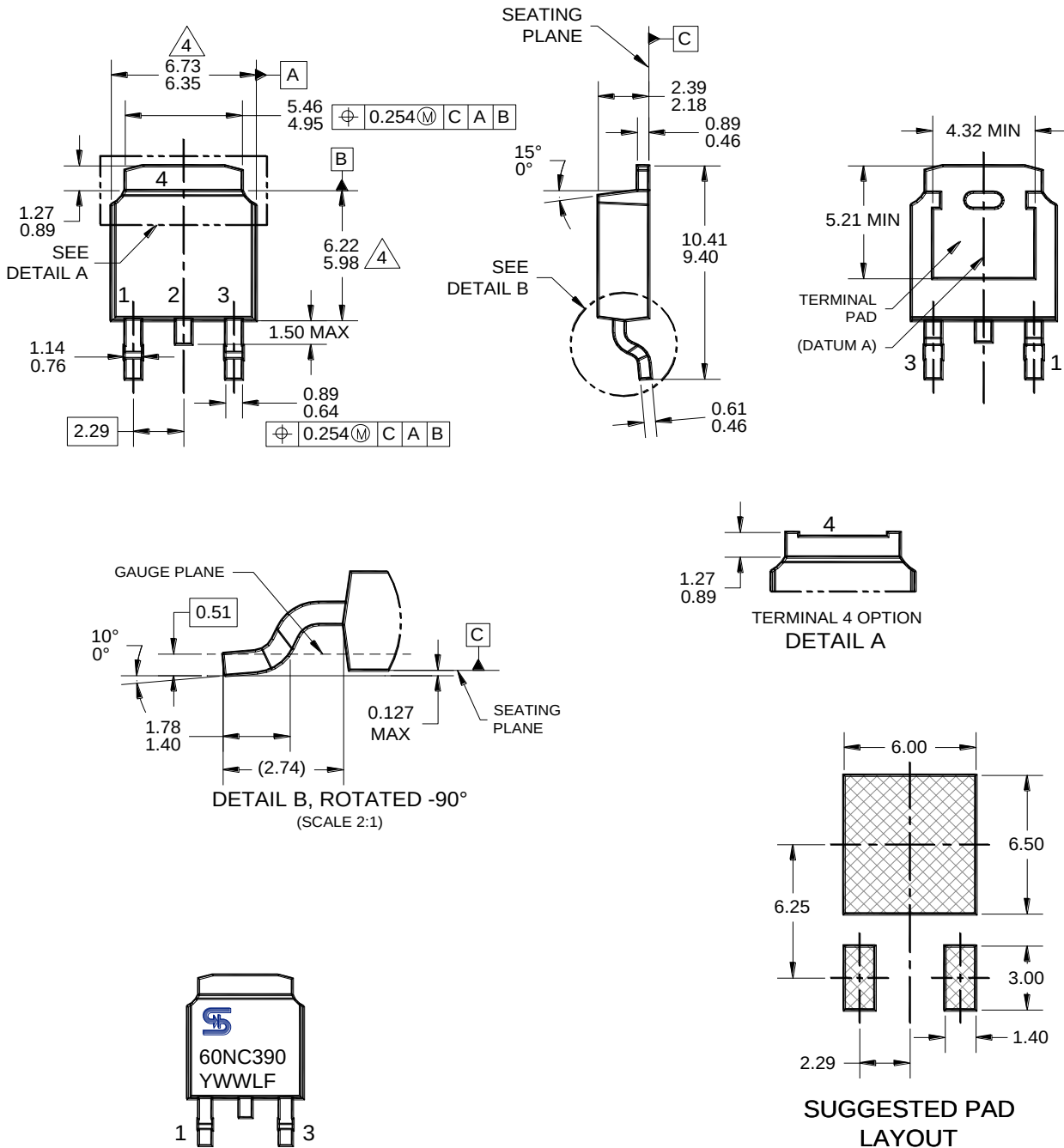
CHARACTERISTICS CURVES

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



PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

TO-252 (DPAK)



MARKING DIAGRAM

Y = YEAR CODE
WW = WEEK CODE (01 ~ 52)
L = LOT CODE (1~9, A~Z)
F = FACTORY CODE

NOTES: UNLESS OTHERWISE SPECIFIED

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
3. PACKAGE OUTLINE REFERENCE: JEDEC TO-252, VARIATION AA, ISSUE F.
4. MOLDED PLASTIC BODY DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION, OR GATE BURRS.
5. DWG NO. REF: HQ2SD07-TO252AA-013 REV A.

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