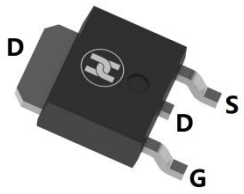
N-CHANNEL HIGH VOLTAGE MOSFET

FEATURES

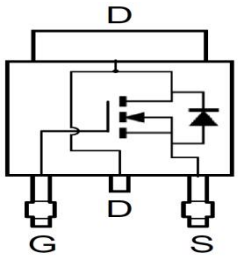
- $R_{DS(ON)}$ =11.5Ω@V_{GS} = 10V.
- Ultra Low gate charge (typical 5.0nC)
- Low reverse transfer capacitance (C_{RSS} = typical 3.0 pF)
- Fast switching capability
- Avalanche energy specified
- Improved dv/dt capability, high ruggedness



TO-252

MECHANICAL DATA

- Case: TO-252
- Case Material: Molded Plastic. UL flammability
- Classification Rating: 94V-0
- Weight: 0.33 grams (approximate)



MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

PARAMETER		SYMBOL	RATINGS	UNIT
Drain-Source Voltage	1N60	V_{DSS}	600	V
	1N65		650	V
Gate-Source Voltage		V_{GSS}	±30	V
Avalanche Current (Note 1)		I_{AR}	1.0	A
Continuous Drain Current		I_D	1.0	A
Pulsed Drain Current (Note 1)		I_{DM}	4.8	A
Avalanche Energy	Single Pulsed (Note 2)	E_{AS}	50	mJ
	Repetitive (Note 1)	E_{AR}	4.0	mJ
Peak Diode Recovery dv/dt (Note 3)		dv/dt	4.5	V/ns
Power Dissipation		P_D	28	W
Junction Temperature		T_J	+150	℃
Operating Temperature		T_{OPR}	-55 ~ +150	℃
Storage Temperature		T_{STG}	-55 ~ +150	℃
Junction-to-Ambient		$R\theta_{JA}$	110	℃/W
Junction-to-Case		$R\theta_{Jc}$	4.53	℃/W

Note: 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.

N-CHANNEL HIGH VOLTAGE MOSFET

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise specified)

PARAMETER		SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
OFF CHARACTERISTICS							
Drain-Source Breakdown Voltage	1N60	BV_{DSS}	V_{GS}=0V, I_D=250μA	600			V
	1N65			650			V
Drain-Source Leakage Current		I_{DSS}	V_{DS}=600V, V_{GS}=0V			10	μA
Gate-Source 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=250μA		0.4		V/℃
ON CHARACTERISTICS							
Gate Threshold Voltage		$V_{GS(TH)}$	V_{DS}=V_{GS}, I_D=250μA	2.0		4.0	V
Static Drain-Source On-State Resistance		$R_{DS(ON)}$	V_{GS}=10V, I_D=0.5A		9.3	11.5	Ω
DYNAMIC CHARACTERISTICS							
Input Capacitance		C_{ISS}	V_{DS}=25V, V_{GS}=0V, f=1MHz		120	150	pF
Output Capacitance		C_{OSS}			20	25	pF
Reverse Transfer Capacitance		C_{RSS}			3.0	4.0	pF
SWITCHING CHARACTERISTICS							
Turn-On Delay Time		$t_{D(ON)}$	V_{DD}=300V, I_D=1.0A, R_G=50Ω (Note 4,5)		5	20	ns
Turn-On Rise Time		t_R			25	60	ns
Turn-Off Delay Time		$t_{D(OFF)}$			7	25	ns
Turn-Off Fall Time		t_F			25	60	ns
Total Gate Charge		Q_G	V_{DS}=480V, V_{GS}=10V, I_D=1.0A (Note 4,5)		5.0	6.0	nC
Gate-Source Charge		Q_{GS}			1.0		nC
Gate-Drain Charge		Q_{GD}			2.6		nC
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS							
Drain-Source Diode Forward Voltage		V_{SD}	V_{GS}=0V, I_S =1.0A			1.4	V
Maximum Continuous Drain-Source Diode Forward Current		I_S				1.2	A
Maximum Pulsed Drain-Source Diode Forward Current		I_{SM}				4.8	A
Reverse Recovery Time		t_{RR}	V_{GS}=0V, I_S=1.0A dI_F/dt=100A/μs (Note1)		160		ns
Reverse Recovery Charge		Q_{RR}			0.3		μC

Note: 1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. L = 60mH, I_{AS} = 1A, V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. I_{SD} ≤ 1.0A, di/dt ≤ 200A/μs, V_{DD} ≤ BV_{DSS}, Starting T_J = 25°C
4. Pulse Test: Pulse Width ≤300μs, Duty Cycle≤2%
5. Essentially Independent of Operating Temperature

Test Circuits and Waveforms

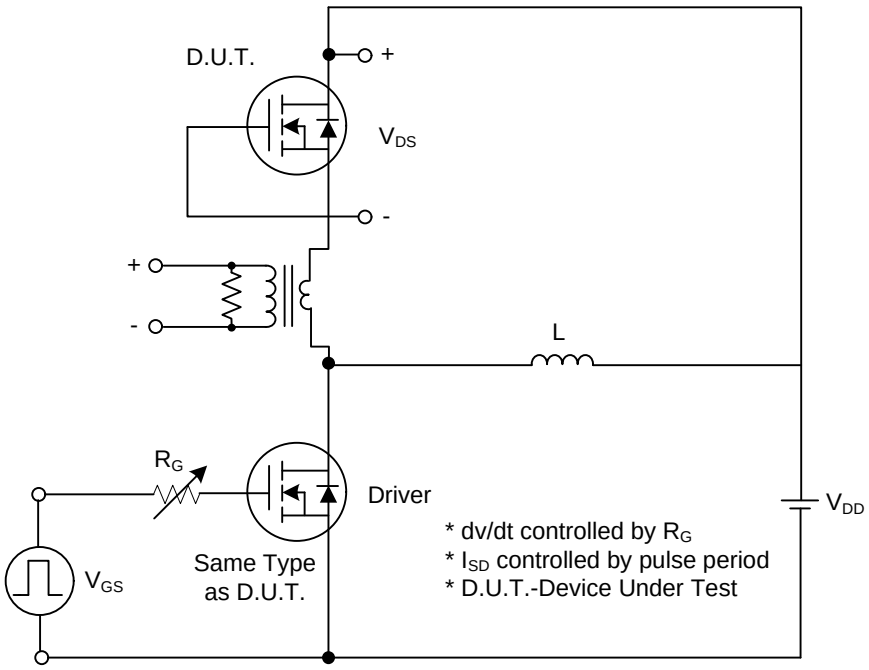


Fig. 1A Peak Diode Recovery dv/dt Test Circuit

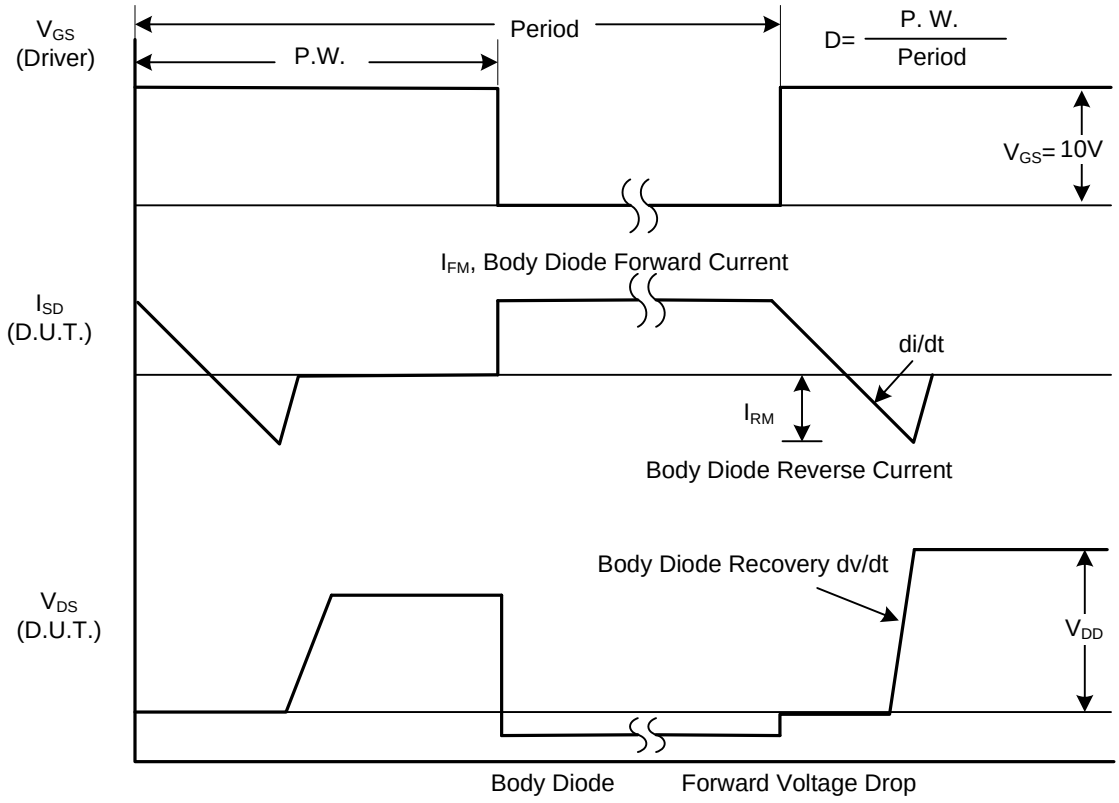


Fig. 1B Peak Diode Recovery dv/dt Waveforms

N-CHANNEL HIGH VOLTAGE MOSFET

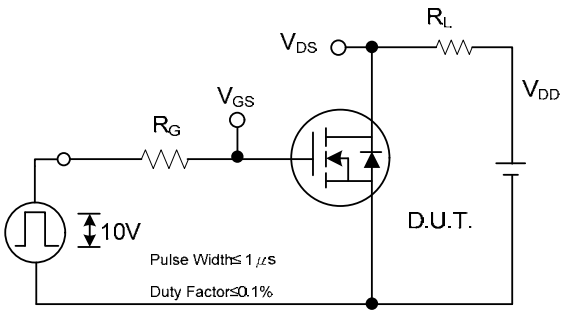


Fig. 2A Switching Test Circuit

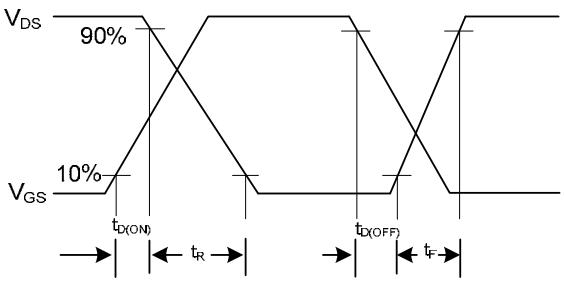


Fig. 2B Switching Waveforms

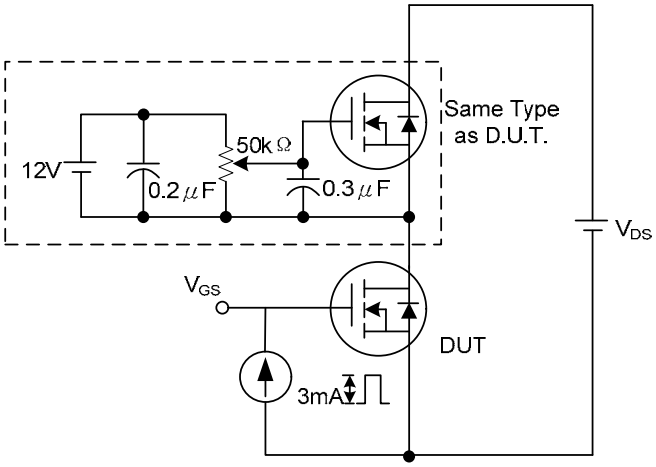


Fig. 3A Gate Charge Test Circuit

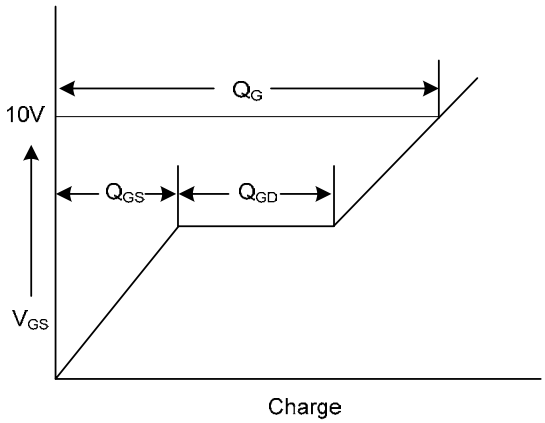


Fig. 3B Gate Charge Waveform

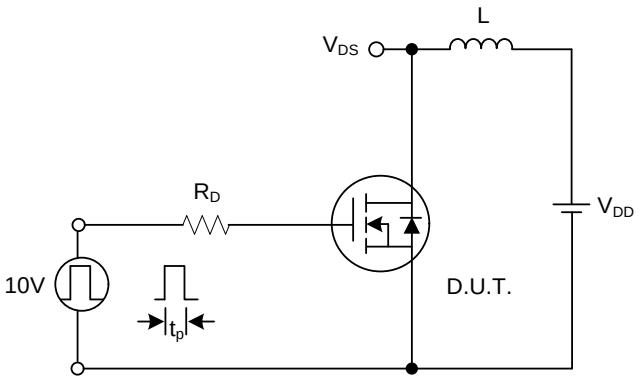


Fig. 4A Unclamped Inductive Switching Test Circuit

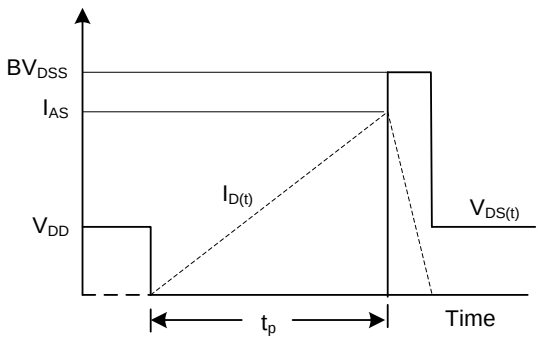
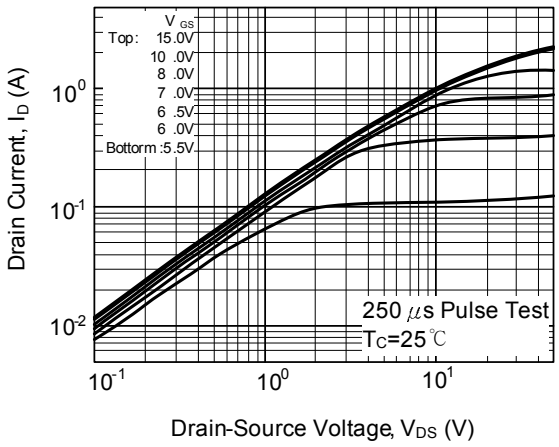


Fig. 4B Unclamped Inductive Switching Waveforms

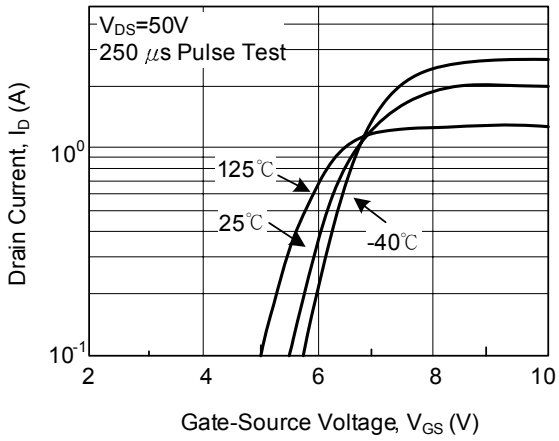
N-CHANNEL HIGH VOLTAGE MOSFET

Typical Characteristics

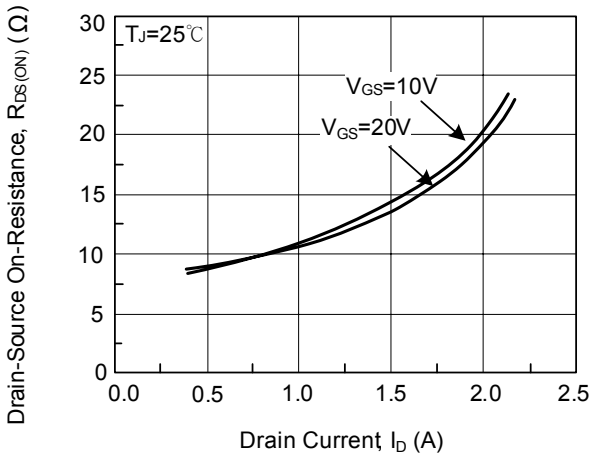
Output Characteristics



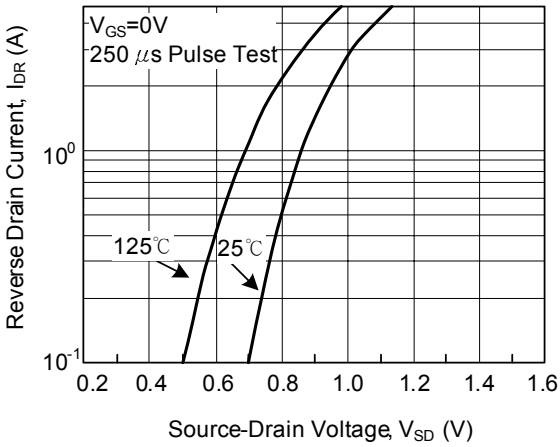
Transfer Characteristics



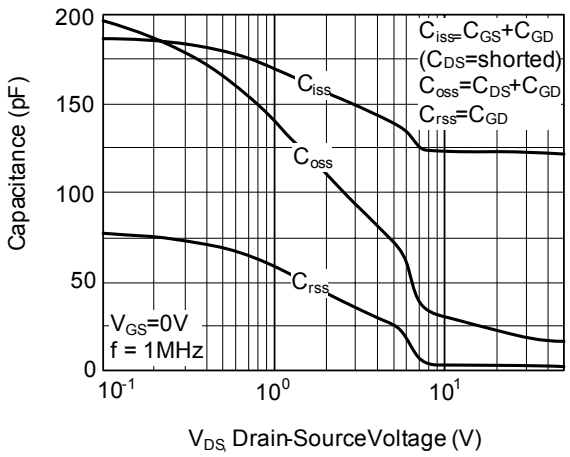
On-Resistance vs. Drain Current



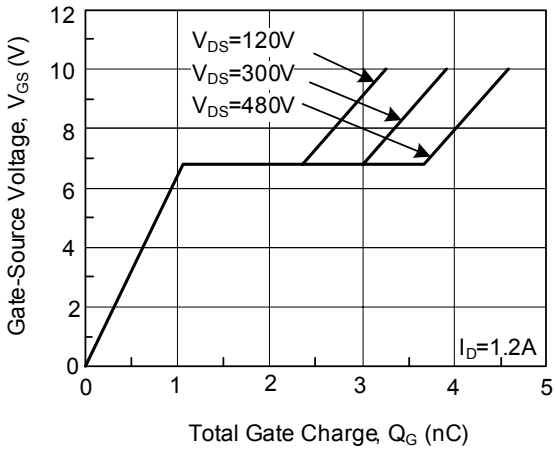
Source- Drain Diode Forward Voltage



Capacitance vs. Drain-Source Voltage

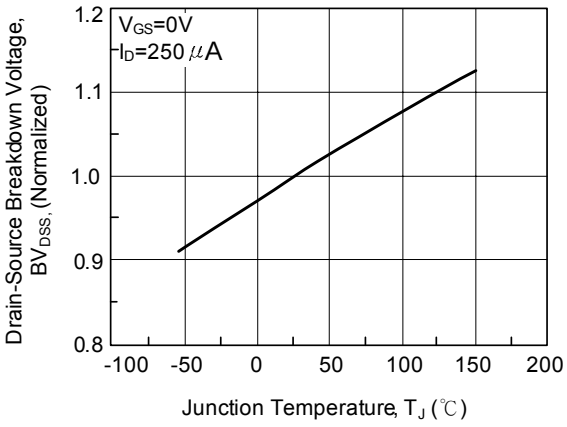


Gate Charge vs. Gate-Source Voltage

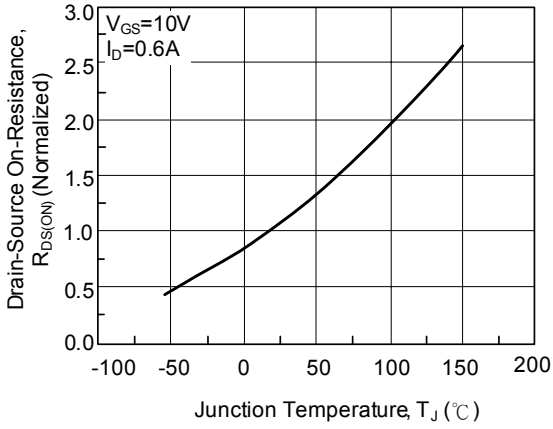


N-CHANNEL HIGH VOLTAGE MOSFET

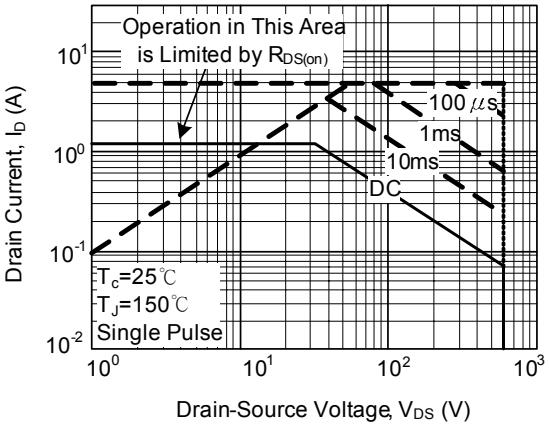
Breakdown Voltage vs. Temperature



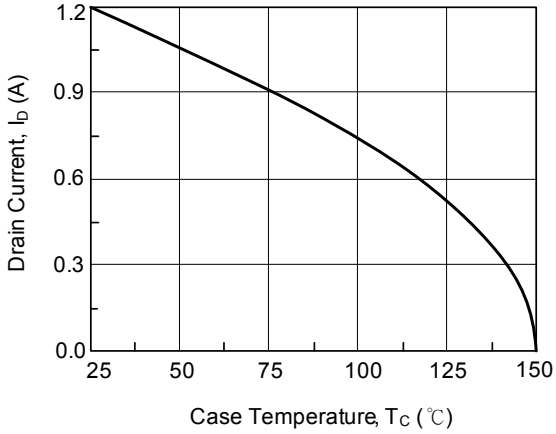
On-Resistance vs. Temperature



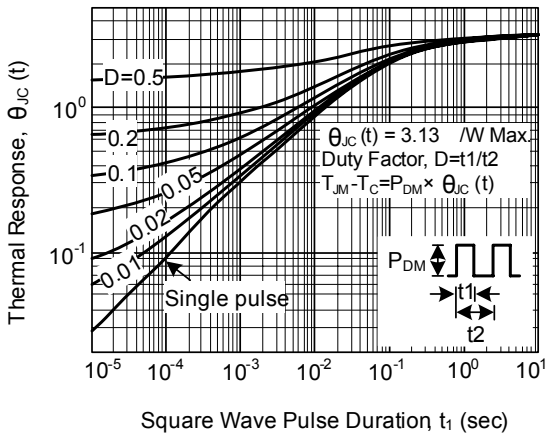
Max. Safe Operating Area



Max. Drain Current vs. Case Temperature

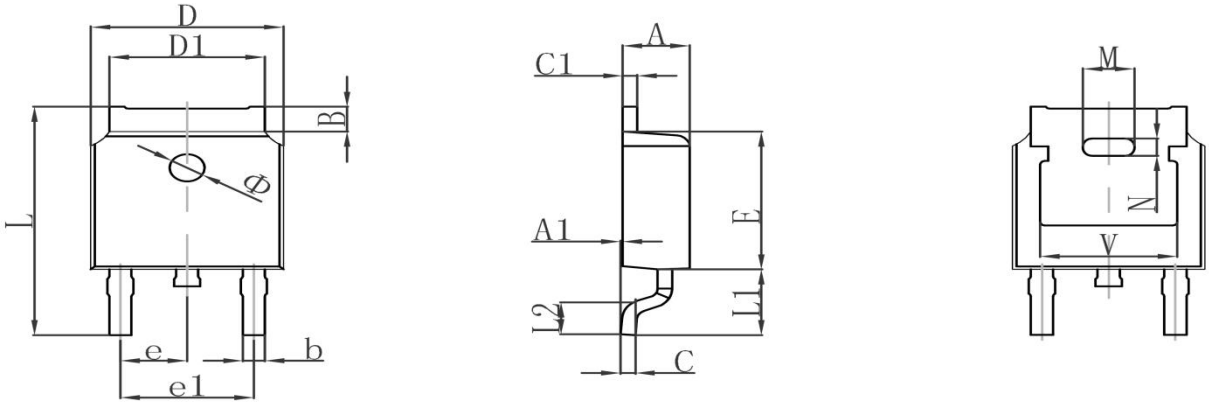


Thermal Response



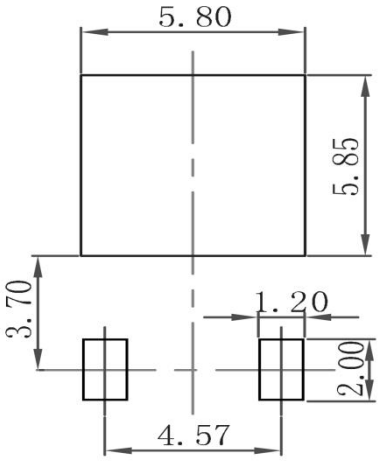
N-CHANNEL HIGH VOLTAGE MOSFET

TO-252 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.380	0.087	0.094
A1	0.000	0.100	0.000	0.004
B	0.800	1.400	0.031	0.055
b	0.710	0.810	0.028	0.032
c	0.460	0.560	0.018	0.022
c1	0.460	0.560	0.018	0.022
D	6.500	6.700	0.256	0.264
D1	5.130	5.460	0.202	0.215
E	6.000	6.200	0.236	0.244
e	2.286TYP		0.090TYP	
e1	4.327	4.727	0.170	0.186
M	1.778REF		0.070REF	
N	0.762REF		0.018REF	
L	9.800	10.400	0.386	0.409
L1	2.9REF		0.114REF	
L2	1.400	1.700	0.055	0.067
V	4.830REF		0.190REF	
Φ	1.100	1.300	0.043	0.051

TO-252 Suggested Pad Layout



Note:

1.Controlling dimension: in millimeters

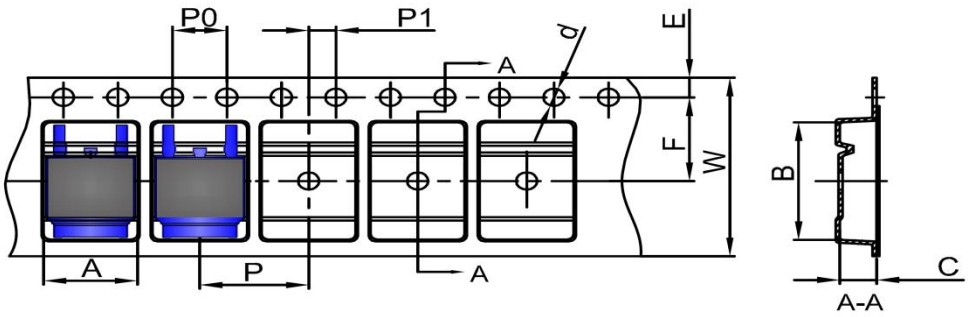
2.General tolerance: ±0.05mm

3.The pad layout is for reference purposes only

N-CHANNEL HIGH VOLTAGE MOSFET

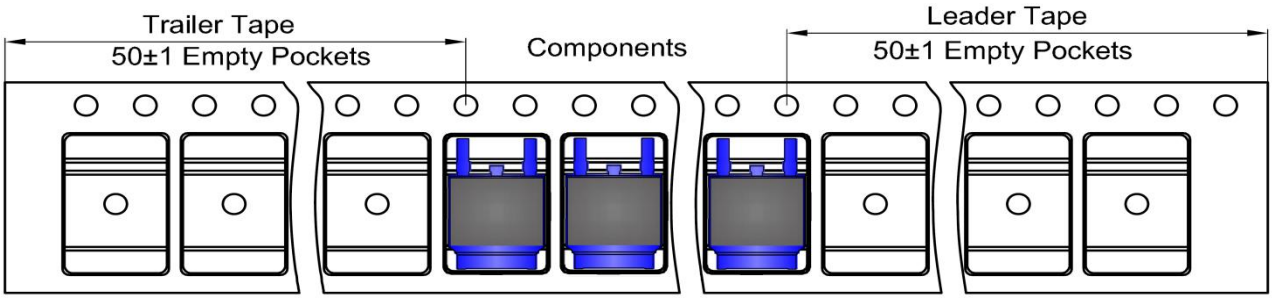
TO-252 Tape and Reel

TO-252 Embossed Carrier Tape

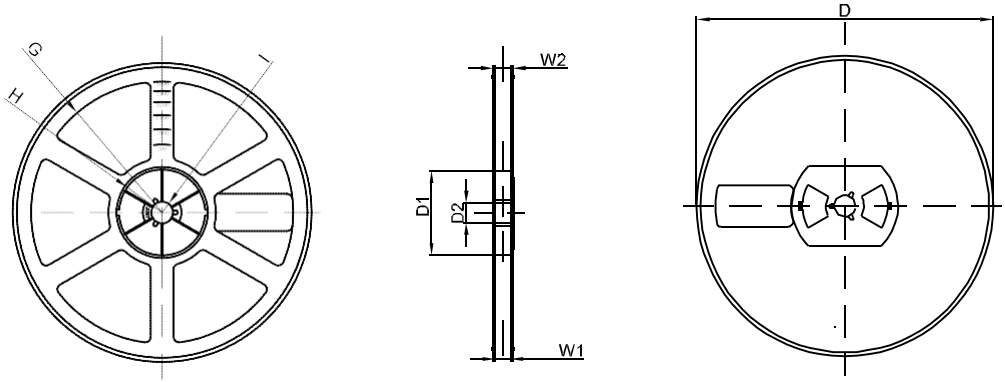


	DIMENSIONS ARE IN MILLIMETER									
TYPE	A	B	C	d	E	F	P0	P	P1	W
TO-252	6.90	10.50	2.70	Ø1.55	1.75	7.50	4.00	8.00	2.00	16.00
TOLERANCE	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1	±0.1

TO-252 Tape Leader and Trailer



TO-252 Reel



	DIMENSIONS ARE IN MILLIMETER							
REEL OPTION	D	D1	D2	G	H	I	W1	W2
13” DIA	Ø330.00	100.00	Φ21.00	R151.00	R56.00	R6.50	16.40	21.00
TOLERANCE	±2	±1	±1	±1	±1	±1	±1	±1