

N-Ch 150V Fast Switching MOSFETs
General Description

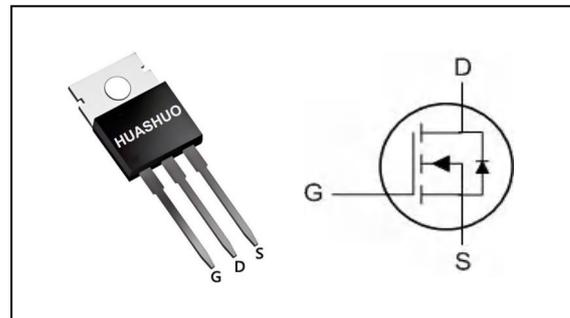
- 100% EAS Guaranteed
- Green Device Available
- Super Low $R_{DS(ON)}$
- Advanced high cell density SGT MOS Technology

Product Summary

V_{DS}	150	V
$R_{DS(ON),typ}$	8.1	m Ω
I_D	90	A

Applications

- Load Switch
- LED Applications
- PWM Application
- Power Management

TO-220 Pin Configuration

Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	150	V
V_{GS}	Gate-Source Voltage	± 20	V
$I_D@T_C=25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	90	A
$I_D@T_C=100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10V^{1,6}$	61	A
I_{DM}	Pulsed Drain Current ²	350	A
EAS	Single Pulse Avalanche Energy ³	530	mJ
$P_D@T_C=25^\circ\text{C}$	Total Power Dissipation ⁴	150	W
T_{STG}	Storage Temperature Range	-55 to 150	$^\circ\text{C}$
T_J	Operating Junction Temperature Range	-55 to 150	$^\circ\text{C}$

Thermal Data

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction-Ambient ¹	---	28	$^\circ\text{C/W}$
$R_{\theta JC}$	Thermal Resistance Junction-Case ¹	---	0.7	$^\circ\text{C/W}$

N-Ch 150V Fast Switching MOSFETs
Electrical Characteristics (T_J=25 °C, unless otherwise noted)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} =0V, I _D =250μA	150	---	---	V
R _{DS(ON)}	Static Drain-Source On-Resistance ²	V _{GS} =10V, I _D =20A	---	8.1	10	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{GS} =V _{DS} , I _D =250μA	2.0	3.0	4.0	V
I _{DSS}	Drain-Source Leakage Current	V _{DS} =120V, V _{GS} =0V, T _J =25°C	---	---	1	μA
		V _{DS} =120V, V _{GS} =0V, T _J =55°C	---	---	5	
I _{GSS}	Gate-Source Leakage Current	V _{GS} =±20V, V _{DS} =0V	---	---	±100	nA
R _g	Gate Resistance	V _{DS} =0V, V _{GS} =0V, f=1MHz	---	3.6	---	Ω
Q _g	Total Gate Charge (10V)	V _{DS} =75V, V _{GS} =10V, I _D =20A	---	50	---	nC
Q _{gs}	Gate-Source Charge		---	19	---	
Q _{gd}	Gate-Drain Charge		---	14	---	
T _{d(on)}	Turn-On Delay Time	V _{DD} =75V, V _{GS} =10V, R _G =4.5Ω, R _L =1Ω, I _D =20A	---	17	---	ns
T _r	Rise Time		---	45	---	
T _{d(off)}	Turn-Off Delay Time		---	48	---	
T _f	Fall Time		---	39	---	
C _{iss}	Input Capacitance	V _{DS} =75V, V _{GS} =0V, f=1MHz	---	3380	---	pF
C _{oss}	Output Capacitance		---	321	---	
C _{rss}	Reverse Transfer Capacitance		---	15	---	

Diode Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I _S	Continuous Source Current ^{1,5}	V _G =V _D =0V, Force Current	---	---	90	A
V _{SD}	Diode Forward Voltage ²	V _{GS} =0V, I _S =50A, T _J =25°C	---	---	1.1	V
t _{rr}	Reverse Recovery Time	I _F =15A, dI/dt=100A/μs, T _J =25°C	---	118	---	nS
Q _{rr}	Reverse Recovery Charge		---	431	---	nC

Note :

- The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
- The data tested by pulsed, pulse width ≤ 300μs, duty cycle ≤ 2%
- The power dissipation is limited by 150°C junction temperature
- The EAS data shows Max. rating. The test condition is V_{DD}=75V, V_{GS}=10V, L=0.3mH, I_{AS}=75A.
- The data is theoretically the same as I_D and I_{DM}, in real applications, should be limited by total power dissipation.
- Package limitation current.

Typical Characteristics

Figure 1: Power De-rating

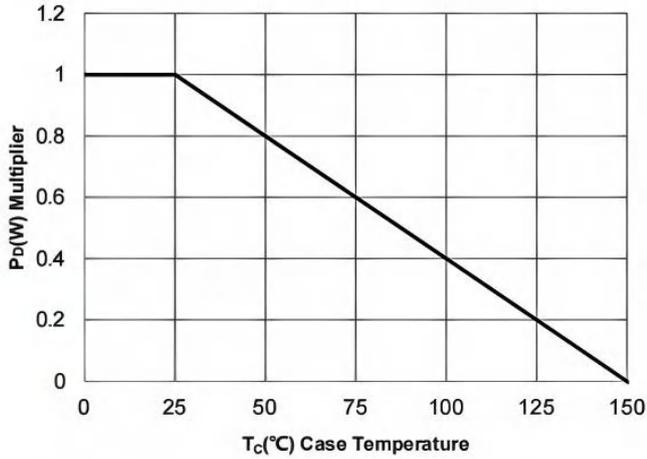


Figure 2: Current De-rating

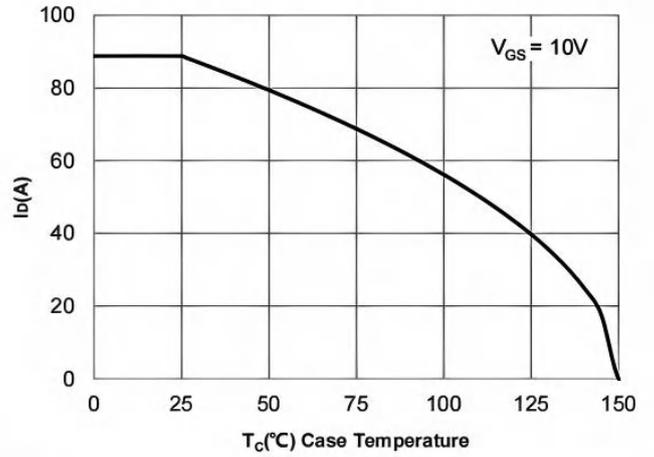


Figure 3: Normalized Maximum Transient Thermal Impedance

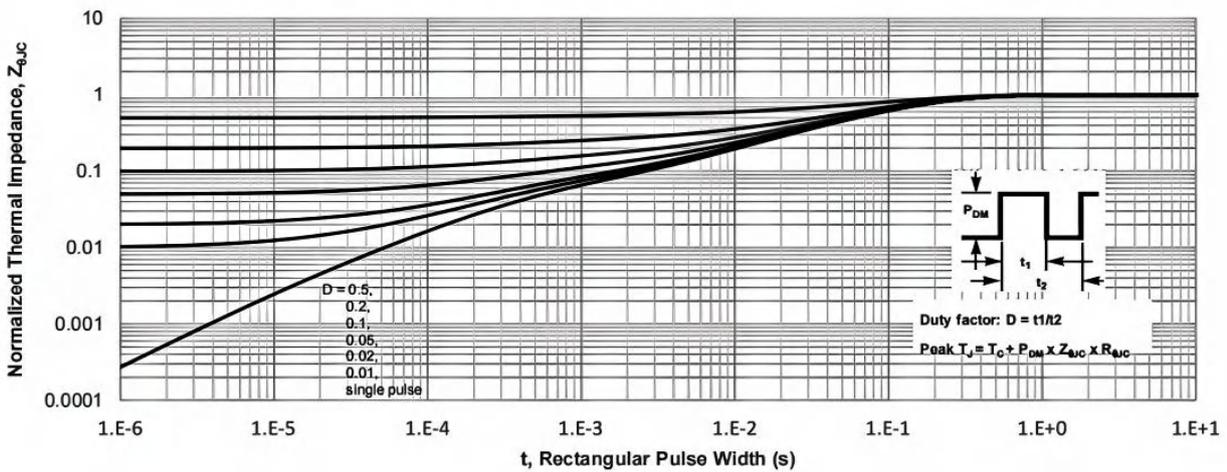
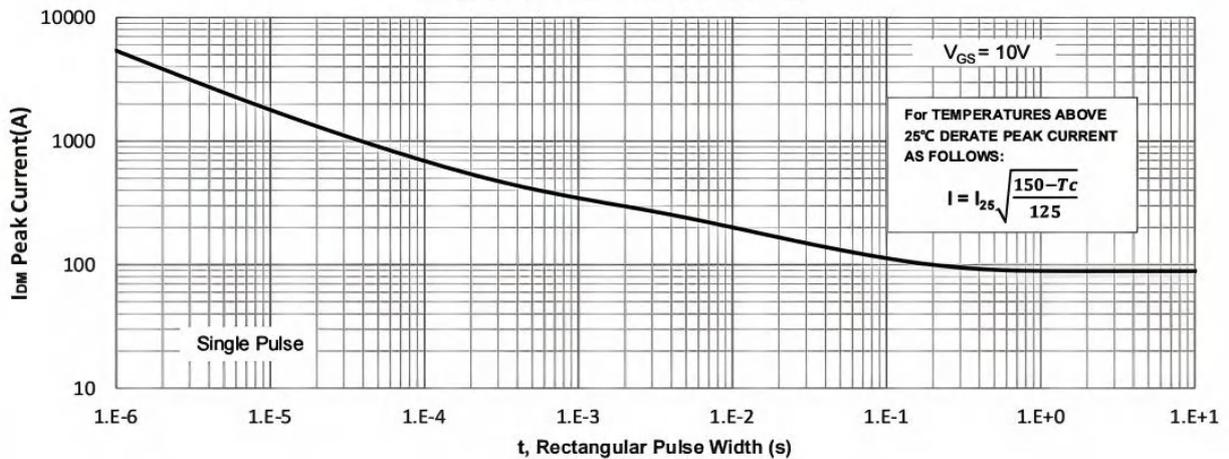


Figure 4: Peak Current Capacity





N-Ch 150V Fast Switching MOSFETs

Figure 5: Output Characteristics

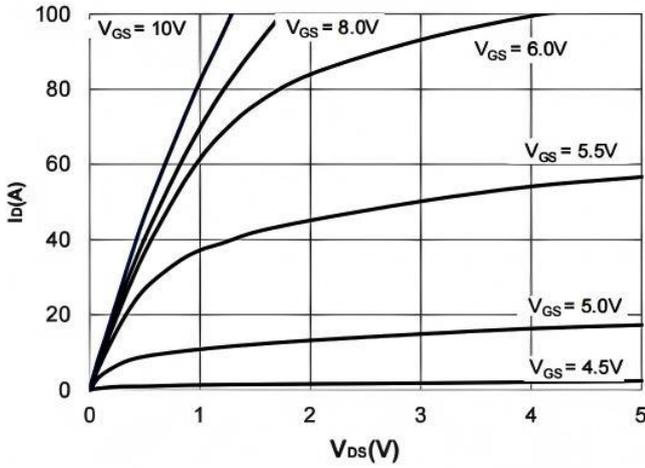


Figure 6: Typical Transfer Characteristics

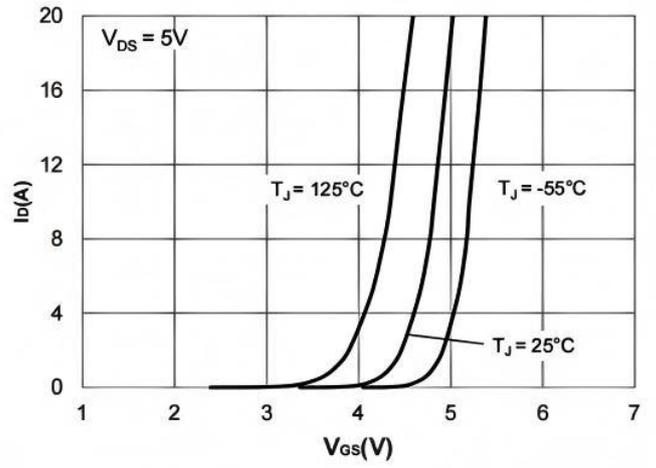


Figure 7: On-resistance vs. Drain Current

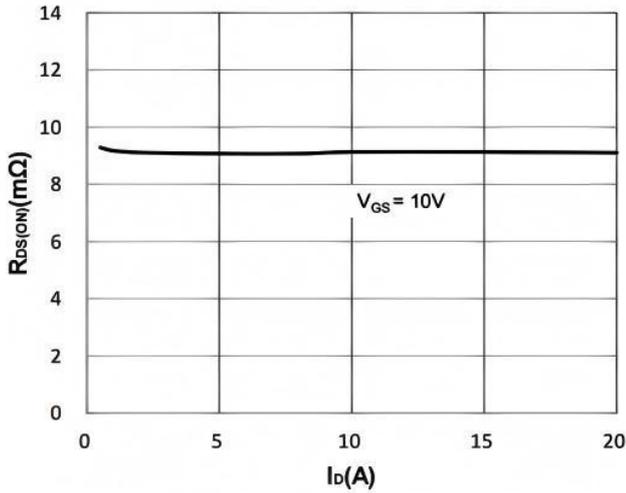


Figure 8: Body Diode Characteristics

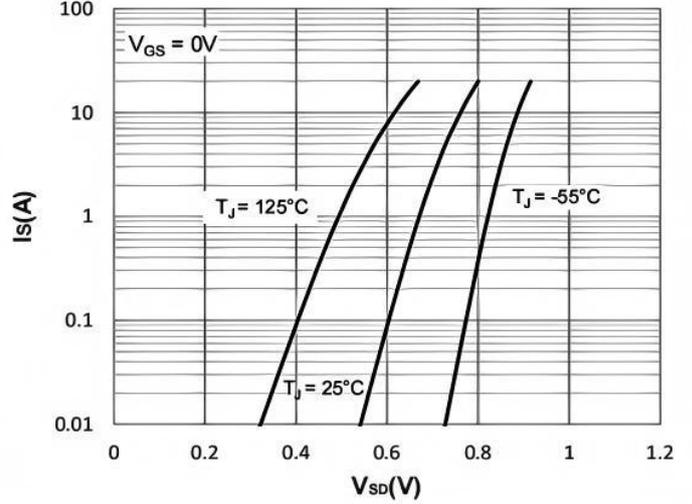


Figure 9: Gate Charge Characteristics

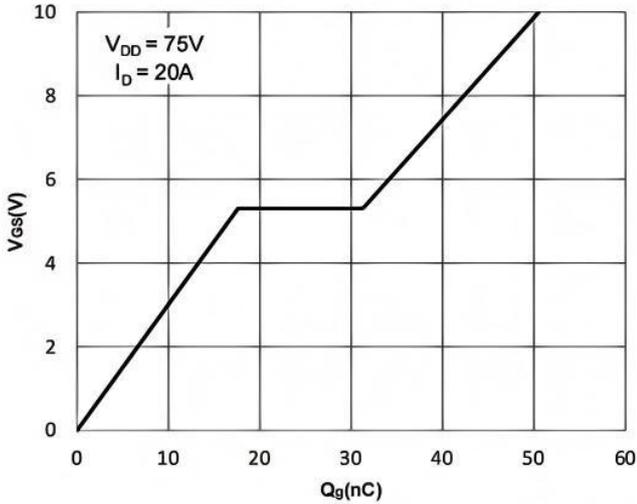
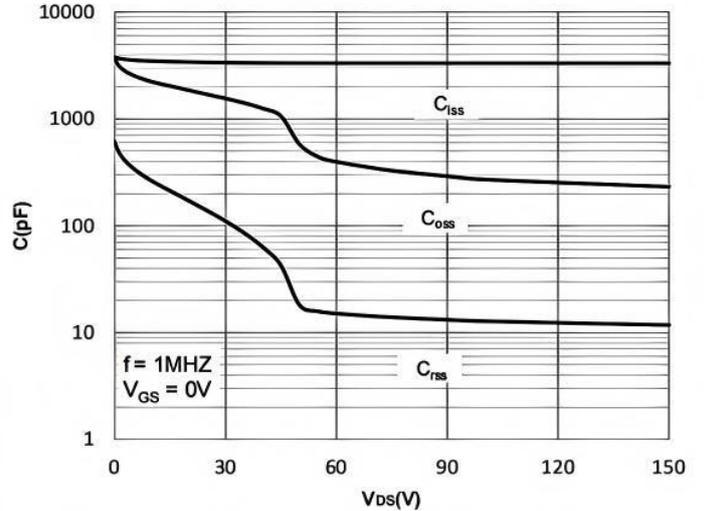


Figure 10: Capacitance Characteristics





N-Ch 150V Fast Switching MOSFETs

Figure 11: Normalized Breakdown voltage vs. Junction Temperature

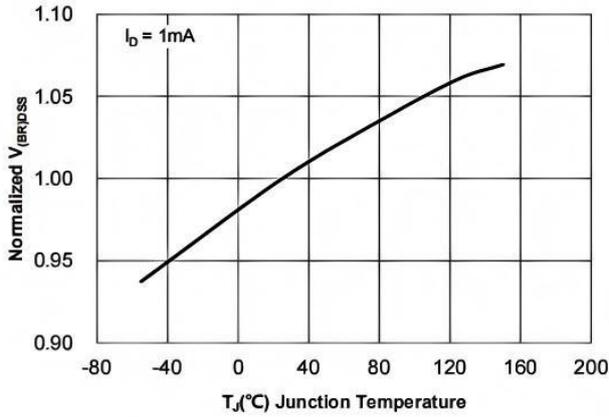


Figure 12: Normalized on Resistance vs. Junction Temperature

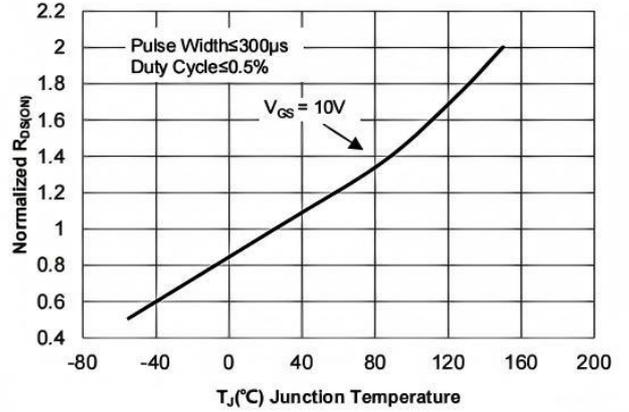


Figure 13: Normalized Threshold Voltage vs. Junction Temperature

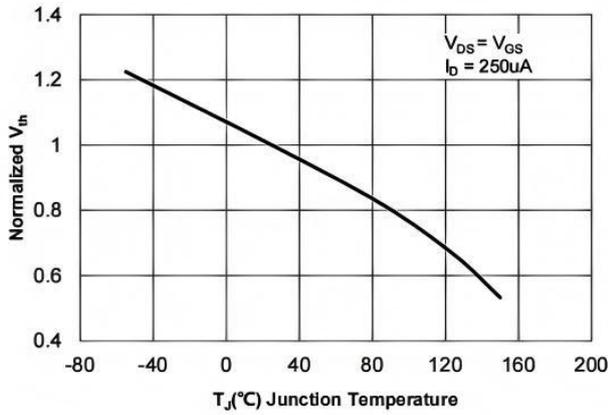


Figure 14: R_{DS(ON)} vs. V_{GS}

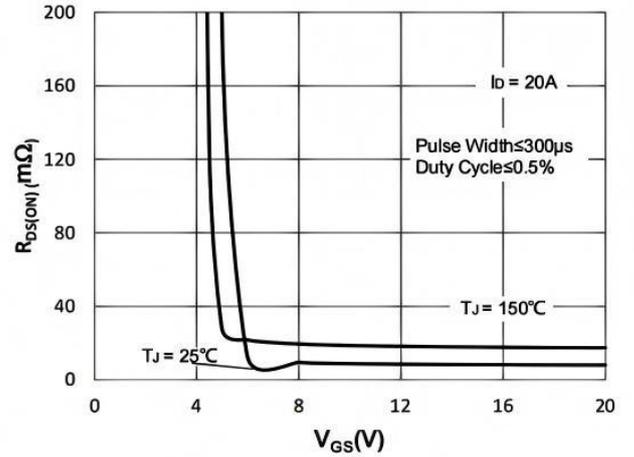
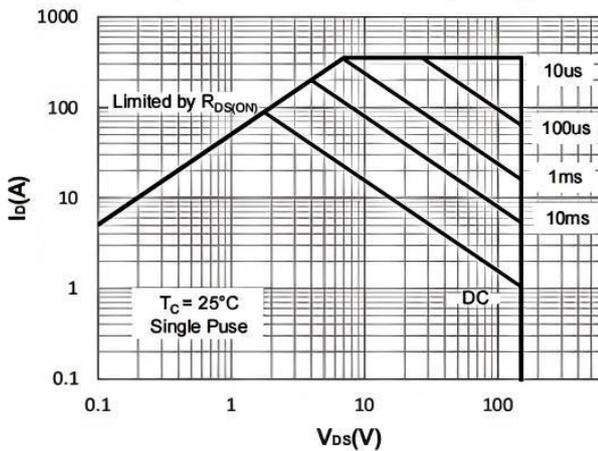


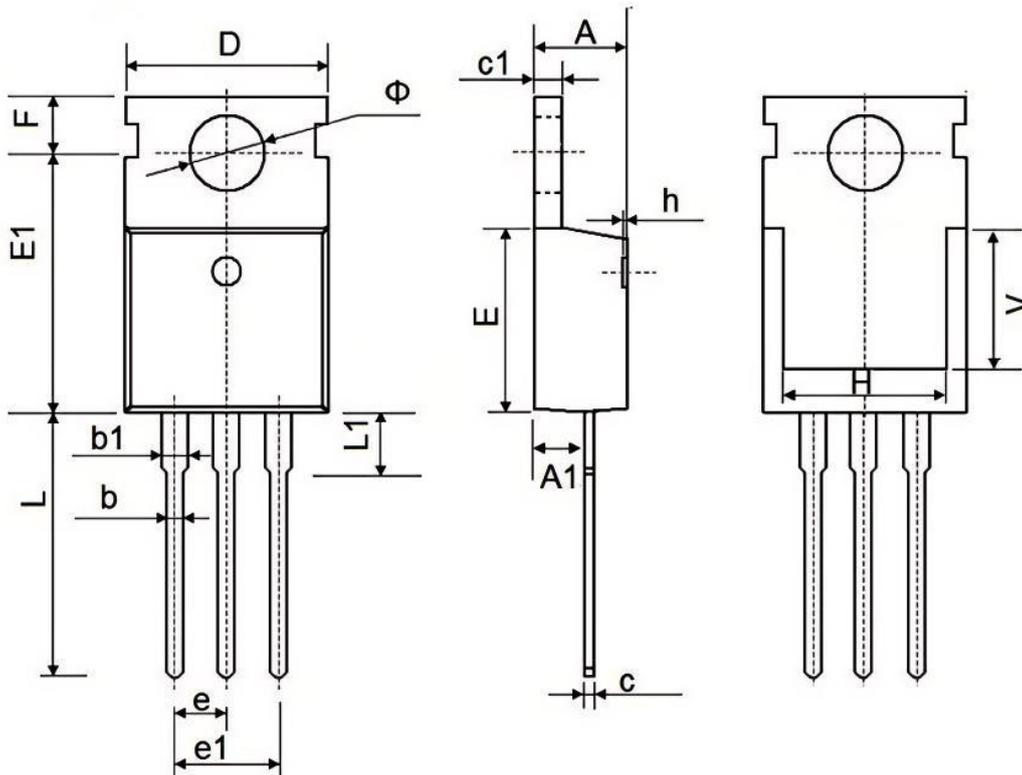
Figure 15: Maximum Safe Operating Area



Ordering Information

Part Number	Package code	Packaging
HSP1504	TO-220	1000/Box

TO-220 Package Outline



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	4.300	4.700	0.169	0.185
A1	2.200	2.600	0.087	0.102
b	0.700	0.950	0.028	0.037
b1	1.170	1.410	0.046	0.056
C	0.450	0.650	0.018	0.026
c1	1.200	1.400	0.047	0.055
D	9.600	10.400	0.378	0.409
E	8.8500	9.750	0.348	0.384
E1	12.650	12.950	0.498	0.510
e	2.540 TYP.		0.100TYP.	
e1	4.980	5.180	0.196	0.204
F	2.650	2.950	0.104	0.116
H	7.900	8.100	0.311	0.319
h	0.000	0.300	0.000	0.012
L	12.750	14.300	0.502	0.563
L1	2.850	3.950	0.112	0.156
V	7.500 REF.		0.295 REF.	
Φ	3.400	4.000	0.134	0.157

HSP1504 Marking:

