

## General Description

The HSCE2530 is the high cell density trench N-ch MOSFETs, which provide excellent RDSON and gate charge for most of the synchronous buck converter applications.

The HSCE2530 meet the RoHS and Green Product requirement, 100% EAS guaranteed with full function reliability approved.

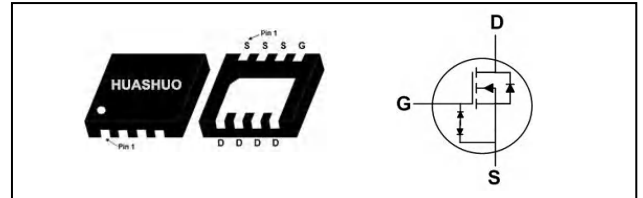
## Features

- Super Low Gate Charge
- 100% EAS Guaranteed
- Green Device Available
- Excellent CdV/dt effect decline
- Advanced high cell density Trench Technology

## Product Summary

|                  |    |            |
|------------------|----|------------|
| $V_{DS}$         | 20 | V          |
| $R_{DS(ON),max}$ | 2  | m $\Omega$ |
| $I_D$            | 50 | A          |

## DFN3.3x3.3 Pin Configuration



## Absolute Maximum Ratings

| Symbol                      | Parameter                                  | Rating     | Units            |
|-----------------------------|--------------------------------------------|------------|------------------|
| $V_{DS}$                    | Drain-Source Voltage                       | 20         | V                |
| $V_{GS}$                    | Gate-Source Voltage                        | $\pm 12$   | V                |
| $I_D@T_C=25^\circ\text{C}$  | Continuous Drain Current <sup>1</sup>      | 50         | A                |
| $I_D@T_C=100^\circ\text{C}$ | Continuous Drain Current <sup>1</sup>      | 39         | A                |
| $I_{DM}$                    | Pulsed Drain Current <sup>2</sup>          | 200        | A                |
| EAS                         | Single Pulse Avalanche Energy <sup>3</sup> | 80         | mJ               |
| $I_{AS}$                    | Avalanche Current                          | 40         | A                |
| $P_D@T_C=25^\circ\text{C}$  | Total Power Dissipation <sup>4</sup>       | 83         | 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 <sup>1</sup> ( $t \leq 10\text{S}$ ) | ---  | 20   | $^\circ\text{C/W}$ |
|                 | Thermal Resistance Junction-ambient <sup>1</sup> (Steady State)          | ---  | 55   | $^\circ\text{C/W}$ |
| $R_{\theta JC}$ | Thermal Resistance Junction-case <sup>1</sup>                            | ---  | 1.5  | $^\circ\text{C/W}$ |



**Electrical Characteristics ( $T_J=25^\circ\text{C}$ , unless otherwise noted)**

| Symbol       | Parameter                                      | Conditions                                     | Min. | Typ. | Max.     | Unit      |
|--------------|------------------------------------------------|------------------------------------------------|------|------|----------|-----------|
| $BV_{DSS}$   | Drain-Source Breakdown Voltage                 | $V_{GS}=0V, I_D=250\mu A$                      | 20   | ---  | ---      | V         |
| $R_{DS(ON)}$ | Static Drain-Source On-Resistance <sup>2</sup> | $V_{GS}=4.5V, I_D=20A$                         | 1.05 | 1.5  | 2        | $m\Omega$ |
|              |                                                | $V_{GS}=2.5V, I_D=20A$                         | 1.4  | 2    | 2.7      | $m\Omega$ |
| $V_{GS(th)}$ | Gate Threshold Voltage                         | $V_{GS}=V_{DS}, I_D=250\mu A$                  | 0.4  | 0.7  | 1.0      | V         |
| $I_{DSS}$    | Drain-Source Leakage Current                   | $V_{DS}=16V, V_{GS}=0V, T_J=25^\circ\text{C}$  | ---  | ---  | 1        | $\mu A$   |
|              |                                                | $V_{DS}=16V, V_{GS}=0V, T_J=125^\circ\text{C}$ | ---  | ---  | 5        | $\mu A$   |
| $I_{GSS}$    | Gate-Source Leakage Current                    | $V_{GS}=\pm 10V, V_{DS}=0V$                    | ---  | ---  | $\pm 10$ | $\mu A$   |
| $R_g$        | Gate Resistance                                | $V_{DS}=0V, V_{GS}=0V, f=1\text{MHz}$          | ---  | 1.2  | ---      | $\Omega$  |
| $Q_g$        | Total Gate Charge (10V)                        | $V_{DS}=15V, V_{GS}=10V, I_D=20A$              | ---  | 77   | ---      | nC        |
| $Q_{gs}$     | Gate-Source Charge                             |                                                | ---  | 8.7  | ---      |           |
| $Q_{gd}$     | Gate-Drain Charge                              |                                                | ---  | 14   | ---      |           |
| $T_{d(on)}$  | Turn-On Delay Time                             | $V_{DD}=15V, V_{GS}=10V, R_G=3\Omega, I_D=20A$ | ---  | 10.2 | ---      | ns        |
| $T_r$        | Rise Time                                      |                                                | ---  | 11.7 | ---      |           |
| $T_{d(off)}$ | Turn-Off Delay Time                            |                                                | ---  | 56.4 | ---      |           |
| $T_f$        | Fall Time                                      |                                                | ---  | 16.2 | ---      |           |
| $C_{iss}$    | Input Capacitance                              | $V_{DS}=10V, V_{GS}=0V, f=1\text{MHz}$         | ---  | 4307 | ---      | pF        |
| $C_{oss}$    | Output Capacitance                             |                                                | ---  | 501  | ---      |           |
| $C_{rss}$    | Reverse Transfer Capacitance                   |                                                | ---  | 321  | ---      |           |

**Diode Characteristics**

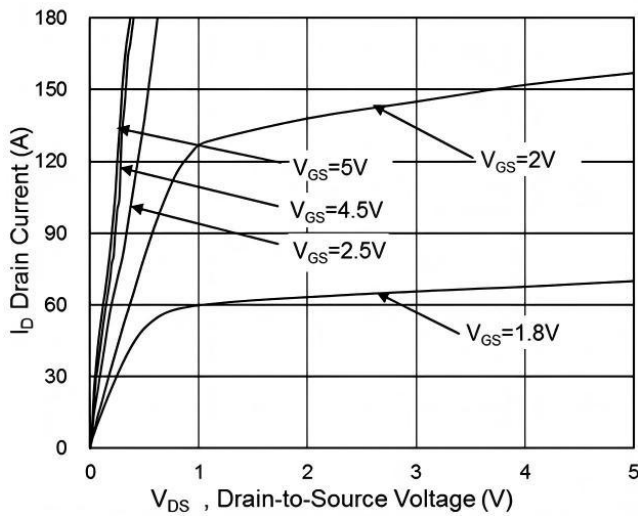
| Symbol   | Parameter                                | Conditions                                        | Min. | Typ. | Max. | Unit |
|----------|------------------------------------------|---------------------------------------------------|------|------|------|------|
| $I_S$    | Continuous Source Current <sup>1,5</sup> | $V_G=V_D=0V$ , Force Current                      | ---  | ---  | 50   | A    |
| $V_{SD}$ | Diode Forward Voltage <sup>2</sup>       | $V_{GS}=0V, I_S=1A, T_J=25^\circ\text{C}$         | ---  | ---  | 1.2  | V    |
| $t_{rr}$ | Reverse Recovery Time                    | $I_F=20A, di/dt=100A/\mu s, T_J=25^\circ\text{C}$ | ---  | 22   | ---  | nS   |
| $Q_{rr}$ | Reverse Recovery Charge                  |                                                   | ---  | 72   | ---  | nC   |

Note :

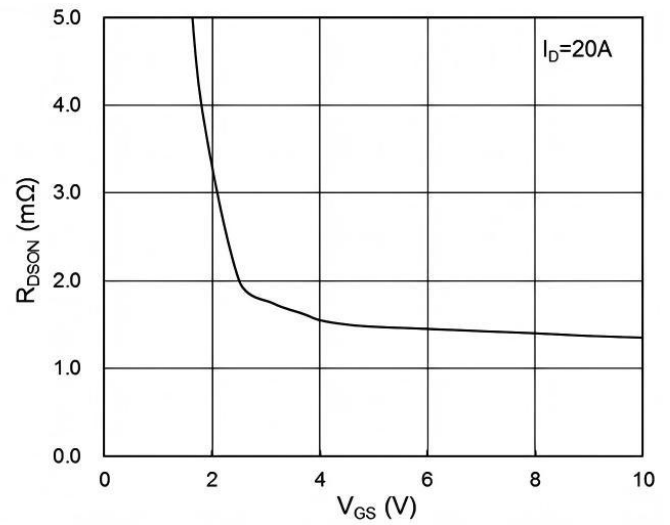
- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width  $\leq 300\mu s$  , duty cycle  $\leq 2\%$
- 3.The EAS data shows Max. rating . The test condition is  $V_{DD}=25V, V_{GS}=10V, L=0.1mH, I_{AS}=40A$
- 4.The power dissipation is limited by  $150^\circ\text{C}$  junction temperature
- 5.The data is theoretically the same as  $I_D$  and  $I_{DM}$  , in real applications , should be limited by total power dissipation.



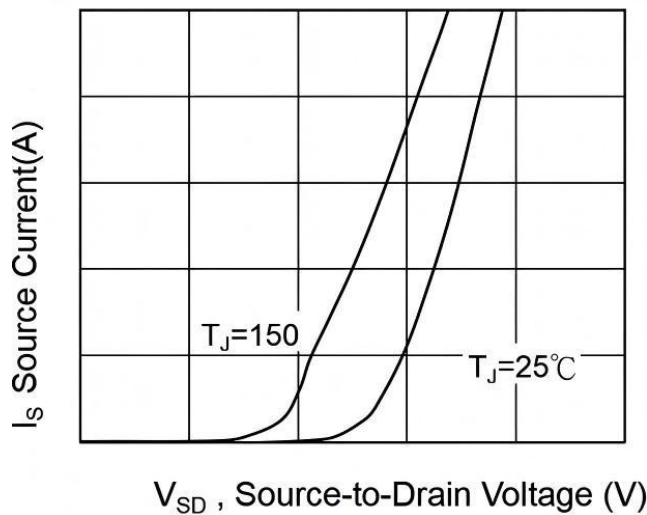
**Typical Characteristics**



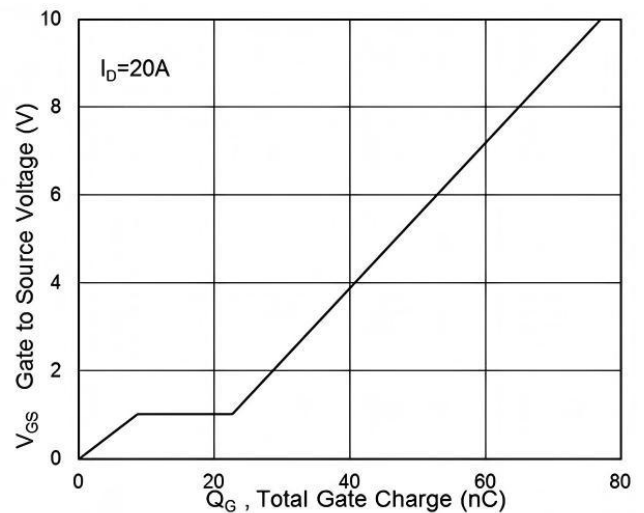
**Fig.1 Typical Output Characteristics**



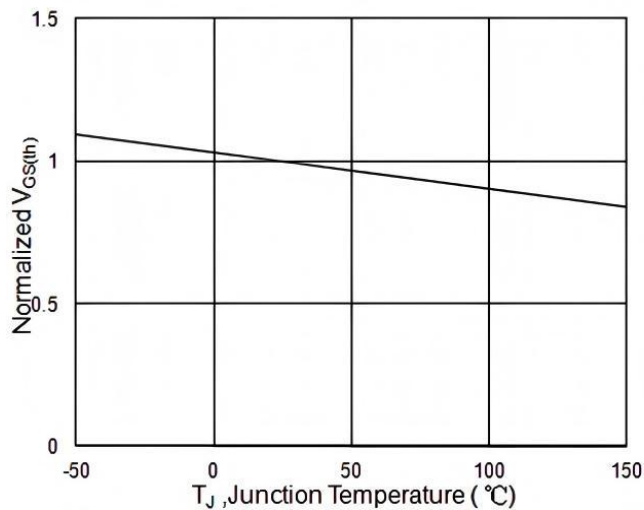
**Fig.2 On-Resistance vs. Gate-Source Voltage**



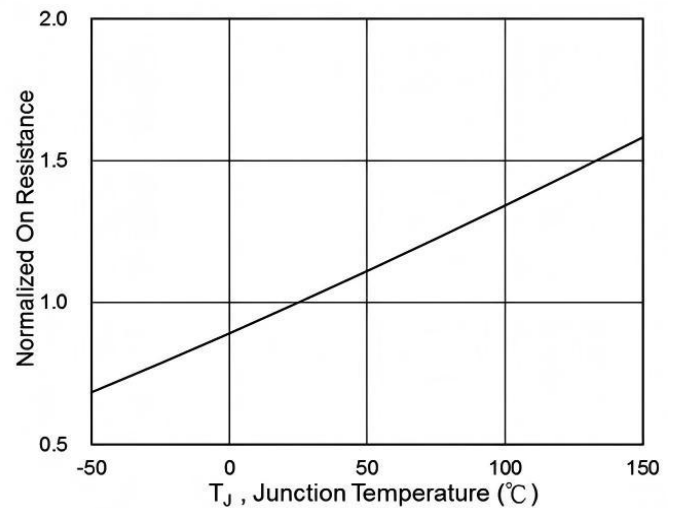
**Fig.3 Forward Characteristics of Reverse**



**Fig.4 Gate-Charge Characteristics**



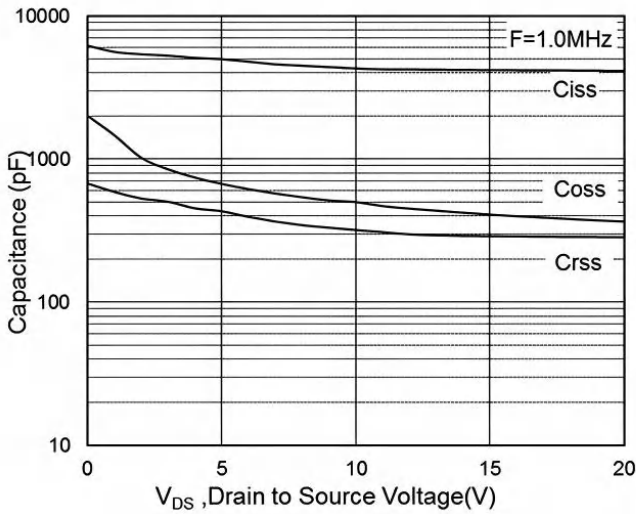
**Fig.5 Normalized  $V_{GS(th)}$  vs.  $T_J$**



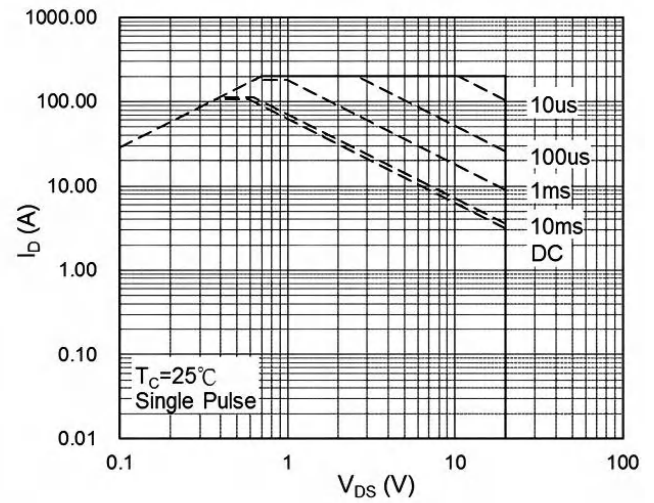
**Fig.6 Normalized  $R_{DS(on)}$  vs.  $T_J$**



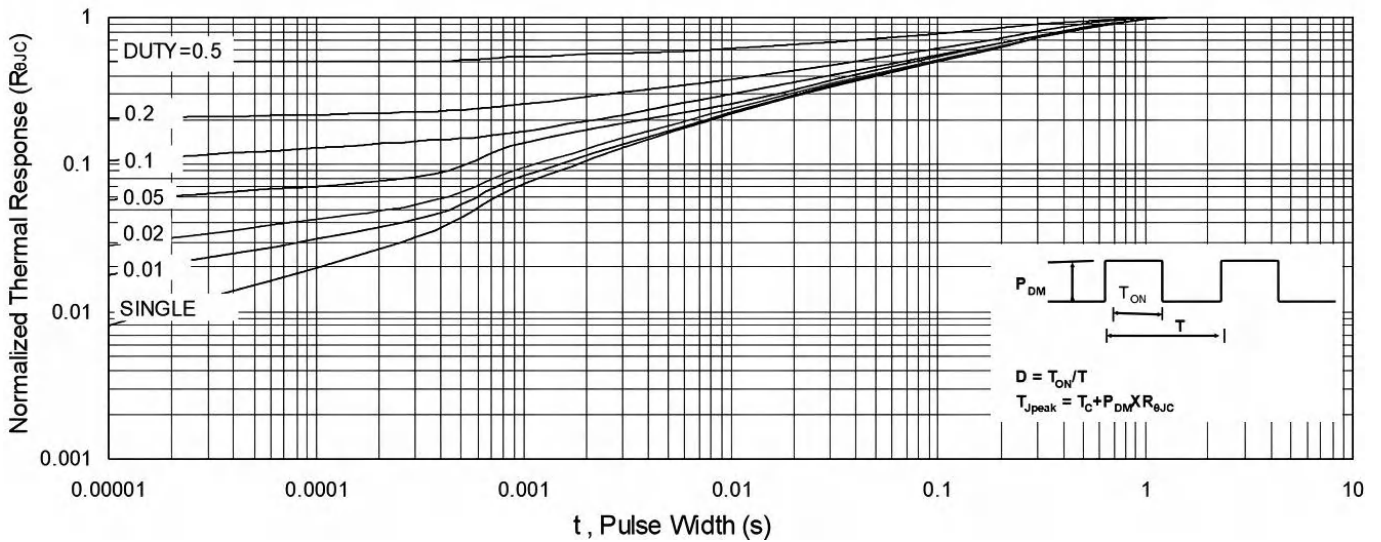
**N-Ch 20V Fast Switching MOSFETs**



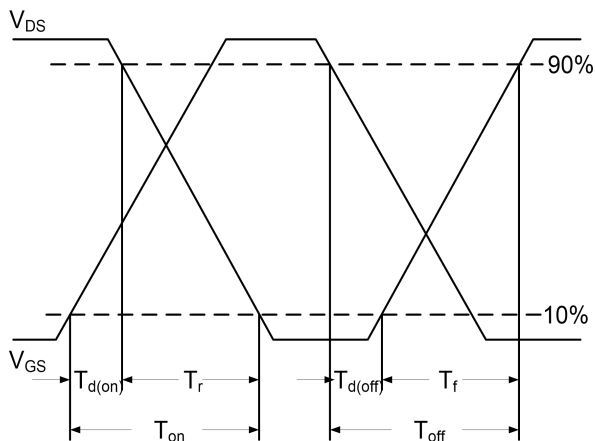
**Fig.7 Capacitance**



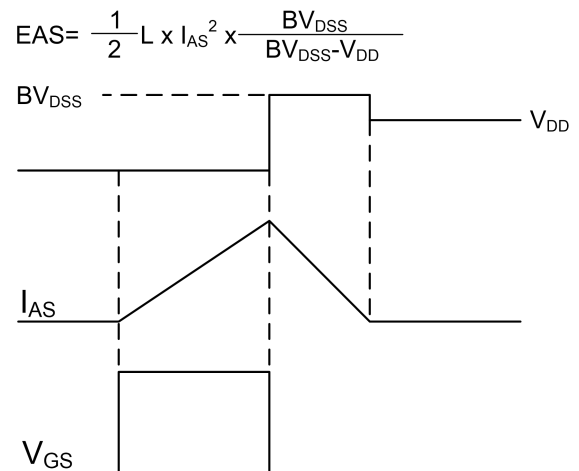
**Fig.8 Safe Operating Area**



**Fig.9 Normalized Maximum Transient Thermal Impedance**



**Fig.10 Switching Time Waveform**

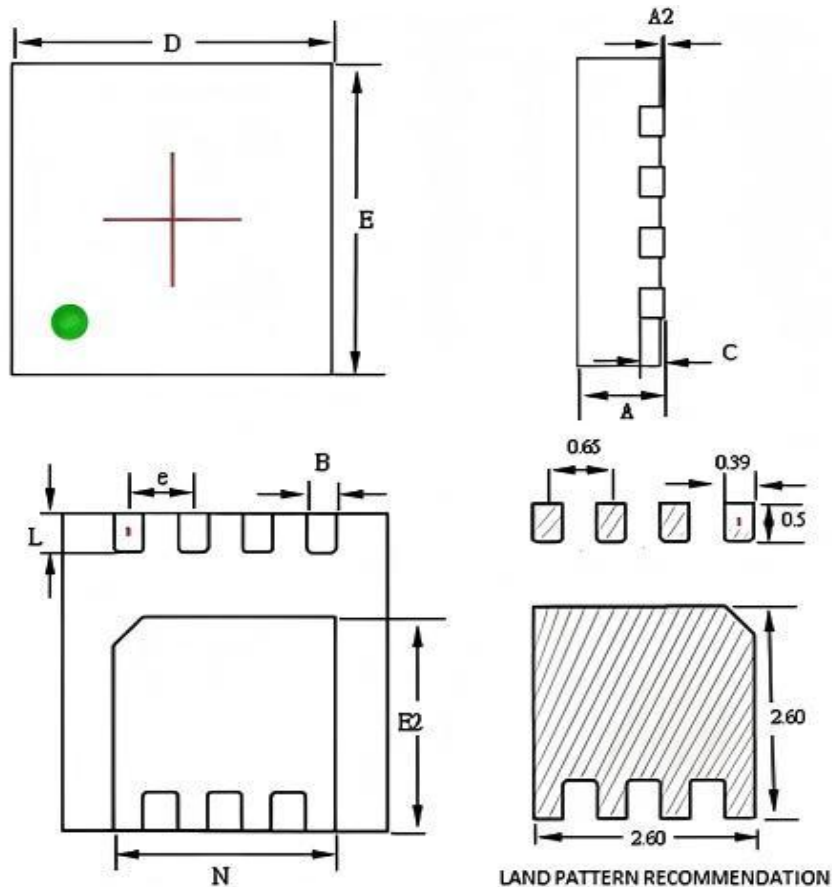


**Fig.11 Unclamped Inductive Switching Waveform**

## Ordering Information

| Part Number | Package code  | Packaging      |
|-------------|---------------|----------------|
| HSCE2530    | DFN3.3x3.3 8L | 3000/Tape&Reel |

DFN3.3x3.3 8L Package Outline



| SYMBOLS | MILLIMETERS |      |      | INCHES |       |       |
|---------|-------------|------|------|--------|-------|-------|
|         | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A       | 0.7         | 0.75 | 0.8  | 0.028  | 0.295 | 0.031 |
| A2      | 0           | --   | 0.05 | 0.000  | --    | 0.002 |
| B       | 0.24        | 0.3  | 0.35 | 0.009  | 0.012 | 0.014 |
| C       | 0.1         | 0.15 | 0.25 | 0.004  | 0.006 | 0.010 |
| D       | 3.15        | 3.3  | 3.4  | 0.124  | 0.130 | 0.134 |
| E       | 3.15        | 3.3  | 3.4  | 0.124  | 0.130 | 0.134 |
| E2      | 2.15        | 2.25 | 2.35 | 0.085  | 0.089 | 0.093 |
| L       | 0.35        | 0.4  | 0.45 | 0.014  | 0.016 | 0.018 |
| N       | 2.1         | 2.25 | 2.35 | 0.083  | 0.089 | 0.093 |
| e       | --          | 0.65 | --   | --     | 0.026 | --    |

## HSCE2530 Marking:

